

Number of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

New South Wales

Australian Catholic University	3
Charles Sturt University	1
Macquarie University	12
Southern Cross University	3
The University of New England	3
The University of New South Wales	84
The University of Newcastle	24
The University of Sydney	65
University of Technology, Sydney	16
University of Western Sydney	6
University of Wollongong	17
Total for New South Wales	234

Victoria

Deakin University	10
La Trobe University	13
Monash University	52
RMIT University	11
Swinburne University of Technology	7
The University of Melbourne	57
Victoria University	1
Total for Victoria	151

Queensland

Central Queensland University	1
Griffith University	10
James Cook University	1
Queensland University of Technology	19
The University of Queensland	79
University of the Sunshine Coast	1
Total for Queensland	111

South Australia

The Flinders University of South Australia	13
The University of Adelaide	28
University of South Australia	5
Total for South Australia	46

Western Australia

Curtin University of Technology	12
Edith Cowan University	1
Murdoch University	4
The University of Western Australia	27
Total for Western Australia	44

**Number of Successful Discovery Projects Proposals for Funding
Commencing in 2015 by State and Organisation**

Tasmania

University of Tasmania	12
Total for Tasmania	12

Northern Territory

Charles Darwin University	1
Total for Northern Territory	1

Australian Capital Territory

The Australian National University	62
University of Canberra	4
Total for Australian Capital Territory	66
Total Number of Grants	665

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

New South Wales

Australian Catholic University

DP150101679 Cumming, Prof Jacqueline J; Wyatt-Smith, Prof Claire M; Dickson, Dr Elizabeth A; Webster, Dr Amanda A; Harris, Prof Karen R; Graham, Prof Steve

2015	\$70,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$45,000.00
Total	\$310,900.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation Australian Catholic University

Project Summary

The Australian Curriculum and Disability Standards for Education create high expectations for education of students with disabilities. Teachers are to address the diversity of student learning needs in their classes, and make adjustments to school-based assessments that enable students with disabilities to demonstrate their learning. Recent reports identify inconsistent practice in schools and the need for evidence-based guidance to inform these adjustments. This longitudinal project involves researcher-teacher collaboration and aims to identify effective assessment adjustments for secondary school students with disabilities, develop system-level protocols for adjustments, and meet national goals of improved education outcomes for these students.

DP150102040 Edwards, A/Prof Susan E; Nuttall, A/Prof Jocelyn G; Grieshaber, Prof Susan J; Wood, Prof Elizabeth A

2015	\$70,000.00
2016	\$71,900.00
2017	\$50,000.00
Total	\$191,900.00

Primary FoR 1301 EDUCATION SYSTEMS

Administering Organisation Australian Catholic University

Project Summary

Traditional play-based learning in early childhood education cannot account for new play: very young children's everyday play with technologies, digital media and popular culture. This project uses a recently developed web-mapping tool to create a pedagogical approach to new play. The pedagogical approach to new play comprises teaching practices and learning outcomes that capitalise on the educational potential of children's everyday play with technologies, digital media and popular culture. It aims to enable teachers to work from a theorised and empirically validated perspective for connecting young children's everyday play with technologies, digital media and popular culture artefacts to their 21st century learning needs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100864 McArthur, Prof Morag; Graham, Prof Anne; Spriggs, Dr Merle P; Chalmers, Dr Jennifer J; Moore, Dr Timothy P; Taplin, Dr Stephanie A

2015	\$140,000.00
2016	\$105,500.00
2017	\$90,000.00
Total	\$335,500.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation Australian Catholic University

Project Summary

There is a growing consensus that children's involvement in social research is important, but considerable uncertainty remains around children's inclusion in research on 'sensitive' issues, reflecting concerns about how to balance children's protection with their participation. Key to this are deeply embedded assumptions and beliefs about children and childhood, especially concerning notions of capacity, agency, vulnerability, dependency and the like. This project aims to better understand and address the tensions between the protection of children and their participation in research, and to explore how ethics committees, parents, other gatekeepers and children themselves manage and navigate these tensions.

**Summary of Successful Discovery Projects Proposals for Funding
Commencing in 2015 by State and Organisation**

Charles Sturt University

DP150102068 Clarke, Dr Stephen P; Kennett, Prof Jeanette M; Savulescu, Prof Julian

2015 \$98,000.00

2016 \$110,300.00

2017 \$125,000.00

Total \$333,300.00

Primary FoR 2201 APPLIED ETHICS

Administering Organisation Charles Sturt University

Project Summary

Medical professionals sometimes decline to provide particular forms of safe, beneficial and legal health care, on the grounds that provision would go against their consciences. Bioethicists and policy makers have failed to identify legitimate limits to the scope of appeals to conscientious objection in health care. This is in large part because the underlying concept "conscience" is unclear. This project aims to advance bioethical debate by producing a philosophically and psychologically informed analysis of conscience, and by applying this to discussions about the legitimate limits to conscientious objection in health care. It is expected to result in academic and non-academic publications and enable improvements to Australian health care policy.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Macquarie University

DP150101363 Bishop, Dr Melanie J; O'Connor, Dr Wayne A; Raftos, Prof David A

2015 \$120,000.00

2016 \$119,900.00

2017 \$108,000.00

Total \$347,900.00

Primary FoR 0602 ECOLOGY

Administering Organisation Macquarie University

Project Summary

This project aims to test whether the flow of beneficial genes from farmed oysters into wild oysters can make natural oyster beds and the ecological communities that they support more resilient to environmental change. Wild oysters are critical to the function of coastal ecosystems. However, wild oyster populations are threatened by environmental change in Australia and around the world. Selectively bred oysters bearing stress resistance genotypes are now commercially farmed in many estuaries on Australia's east coast and may be used to bolster wild oyster populations. This project endeavours to develop novel genetic strategies to future-proof oysters. Thus, the outcome of this project has potential to benefit entire ecosystems that depend upon oysters.

DP150100419 Castles, Prof Anne E; Nation, Prof Kate; Gaskell, Prof Gareth

2015 \$163,000.00

2016 \$158,200.00

2017 \$170,000.00

2018 \$170,000.00

Total \$661,200.00

Primary FoR 1799 OTHER PSYCHOLOGY AND COGNITIVE SCIENCES

Administering Organisation Macquarie University

Project Summary

To become skilled readers, children need to move from sounding words out to recognising them rapidly via access to rich, long-term memory representations. Little is known about how this transition is achieved, and why some children have difficulty. This project aims to address these questions in a set of learning studies with typically-developing and reading-impaired children, focussing particularly on the long-term consolidation of word representations. The project will explore the role of sleep in promoting the consolidation process, in both children and adults. The findings are expected to directly inform theory and practice in reading acquisition and enhance the treatment of reading difficulties.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101172 Cheng, Prof Ken; Zeil, Prof Jochen; Narendra, Dr Ajay; Barron, Dr Andrew B; Wehner, Prof Rudiger

2015	\$291,000.00
2016	\$201,900.00
2017	\$221,000.00
2018	\$200,000.00
Total	\$913,900.00

Primary FoR 0608 ZOOLOGY

Administering Organisation Macquarie University

Project Summary

Navigation is one of the most crucial and most challenging problems animals face. Behavioural analyses have shown that animals make use of a number of different mechanisms to navigate, but very little is known of how different forms of spatial information are processed and integrated by the brain. The project aims to tackle this by placing tethered ants in a virtual-reality simulation of their real environment allowing precise control of visual navigational cues, as well as the opportunity to study the brains of the tethered ants as they solve the real-world challenge of finding home. This may reveal how simple brains efficiently solve navigational tasks, which may inform both cognitive biology and bio-inspired computation.

DP150103242 Esselle, Prof Karu P; Bird, Prof Trevor S; Matekovits, Asst Prof Ladislau; Hay, Dr Stuart G; Kildal, Prof Per-Simon

2015	\$130,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$120,000.00
Total	\$485,100.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation Macquarie University

Project Summary

A rapidly growing demand for fast wireless services calls for wideband communication systems with wideband antennas, which are compact, aesthetically appealing and inexpensive, yet have good performance. With novel concepts, this project aims to produce a new class of antennas that deliver impressive performance (bandwidth and gain) while taking up a dramatically reduced area in a way that was impossible before, increasing a figure-of-merit to up to seven times the state-of-the-art. Their planar geometry and simplicity lead to low cost. This is expected to create new knowledge, design methods and examples, prototypes, test results and guidelines required to design, optimise and make these versatile antennas for emerging robust broadband wireless systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102968 Goot, Prof Murray

2015	\$92,221.00
2016	\$95,000.00
2017	\$81,261.00
2018	\$65,021.00
Total	\$333,503.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation Macquarie University

Project Summary

Opinion polls are an increasingly prominent and problematic part of politics in modern societies. This project is expected to produce an Australian history that documents and explains the diverse and changing methods, priorities and styles of the pollsters since polling was introduced to Australia in 1941. It aims to examine the growing media coverage of the polls, their impact, and the controversies they have engendered as well as the performances of polls in predicting voter behaviour. Combining archival research, oral histories and quantitative methods, the project aims to enrich our understanding of the nature, consequences and history of polling nationally and transnationally. It also aims to produce a database containing over 75 years of poll results.

DP150100328 Handley, Dr Heather K; Turner, Prof Simon P; Reagan, Prof Mark K; Barclay, Dr Jennifer

2015	\$125,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$340,500.00

Primary FoR 0403 GEOLOGY

Administering Organisation Macquarie University

Project Summary

The short-lived lead isotope, 210Pb, has the unique ability to place timescale constraints on volcanic processes, such as the input, mixing and degassing of magma. These processes are believed to be of fundamental importance in the triggering of volcanic eruptions. This project will measure 210Pb isotopic compositions and elemental diffusion profiles in crystals of volcanic rocks that represent the end members of mixed magmas to constrain the volume and timescale of volatile transfer from magmatic recharge and also the time between magma mixing events and eruptions. The project aims to test the paradigm that magma recharge triggers volcanic eruptions and aims to yield significant outcomes for understanding eruption triggers at hazardous volcanoes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104380 Hanly, Prof Stephen V; Whiting, Dr Philip A; Borst, Prof Dr Simon

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation Macquarie University

Project Summary

This project aims to design and analyse new protocols for (wireless) WiFi networks. The demand on current WiFi networks is escalating at a tremendous rate. WiFi uses the unlicensed radio spectrum, so innovation can occur more easily over WiFi than over carrier-owned networks. WiFi also provides data offloading from severely congested cellular wireless networks. Unfortunately, the current WiFi multiple access protocols were not designed to handle closely packed WiFi networks and the resulting interference. This project takes a novel approach to develop algorithms that are much more robust to interference, and which use simple, distributed mechanisms to feed channel state information back from the receiver to the transmitter to maximise performance.

DP150102054 Mildren, A/Prof Richard P; Stampfl, Prof Catherine M

2015	\$160,000.00
2016	\$131,400.00
2017	\$123,000.00
Total	\$414,400.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Macquarie University

Project Summary

There is intense interest in exploiting diamond's remarkable properties in many fields of science and technology, but fabricating and processing devices remains a major challenge. This project will build on previous work, using a recently discovered novel laser-induced surface phenomenon that enables, for the first time for any material, the exciting prospect of using light to manipulate surface atoms with atomic precision. This project aims to elucidate the mechanisms underpinning the optical interaction to reveal its full potential and use it to address key problems in diamond nano-device fabrication that lie beyond the reach of current techniques. It is expected that the outcomes will directly enhance Australia's current strengths in diamond-based quantum and photonic technologies.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102502 Sheehan, Dr Paul G; Ng, Dr Lynda; Boehmer, Prof Elleke D

2015	\$80,000.00
2016	\$50,500.00
2017	\$39,060.00
Total	\$169,560.00

Primary FoR 2005 LITERARY STUDIES

Administering Organisation Macquarie University

Project Summary

The reputation of J. M. Coetzee has undergone a dramatic global upsurge in the past 15 years, coinciding with his relocation to Australia and subsequent adoption of citizenship in 2002. This project aims to explore the proposition that the writings of the South African-born Coetzee possess profound and abiding transnational qualities, and then map the global shifts that this work has undergone in the new century. By examining these aspects through Coetzee's position in his adopted country, the project seeks to re-examine notions of Australian nationality and the parameters of its literary, cultural and political identity, moving them beyond an insular, border-defined understanding towards a wider international frame.

DP150100105 Stevenson, Prof Richard J; Boakes, Prof Robert A; Oaten, Dr Megan J; Yeomans, Prof Martin

2015	\$62,000.00
2016	\$93,000.00
2017	\$102,000.00
2018	\$50,000.00
Total	\$307,000.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Macquarie University

Project Summary

Animals fed a Western-style (W-S) diet high in saturated fat and added sugar rapidly develop cognitive impairments, which include disrupted food-intake control. This project aims to see if this also occurs in lean healthy people who eat a W-S diet. That is, are W-S diets associated with impaired cognition, and especially food-intake control, in adults and children, and is this caused by a W-S diet? Obesity is a major public health issue and the significance of this project lies in testing a new account of how overeating may first occur. The expected outcome aims to show that a W-S diet can disrupt various aspects of cognition in adults and children, including food-intake control, providing an entirely new basis to argue for a better diet.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102312 Timmer, Dr Jaap

2015	\$48,544.00
2016	\$46,600.00
2017	\$30,000.00
Total	\$125,144.00

Primary FoR 1601 ANTHROPOLOGY

Administering Organisation Macquarie University

Project Summary

Notions of society and state originating in Christian belief are universal in the Pacific yet remain largely unaccounted for in development work and theories of state-building. Using the Solomon Islands as a case study, this project seeks to address the question of how people living in so-called "failed states" think about the nature of the state, the sources of its shortcomings and the possibilities of alternative state forms. The project is expected to advance theoretical understanding of state-building and provide evidence for the importance of integrating local belief contexts into international development practice.

DP150100444 Tregenza, Dr Ian; Gascoigne, Prof John

2015	\$76,172.00
2016	\$72,400.00
2017	\$69,185.00
Total	\$217,757.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation Macquarie University

Project Summary

What does it mean to say that Australia is a secular state? How did that self-conception develop and how has the meaning of 'secular' changed over the course of the nation's history? These are the fundamental questions that shape this study of the inter-relationship of the secular and religion within the Australian polity from 1788 to the end of World War II. The project will be illuminated by the increasingly sophisticated literature on secularisation and the international comparisons it aims to facilitate. The outcome is expected to be a historically informed explanation of distinctively Australian attitudes to secularity, which may provide the basis for a more informed national debate over issues of religion and citizenship.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Southern Cross University

DP150102092 Eyre, Prof Bradley D; Schulz, A/Prof Kai G; Andersson, Asst Prof Andreas

2015 \$121,000.00

2016 \$123,700.00

2017 \$105,000.00

Total \$349,700.00

Primary FoR 0402 GEOCHEMISTRY

Administering Organisation Southern Cross University

Project Summary

Dissolution of calcium carbonate (CaCO₃) in sediments in the context of ocean acidification is poorly understood. This project will use *in situ* advective benthic chamber incubations and experimental manipulations under future ocean acidification scenarios to determine the controls on the dissolution of CaCO₃ in sediments. This project is significant because changes in the dissolution of CaCO₃ in sediments in an acidifying ocean are at least as important, and potentially more important, than calcification to the future accretion and survival of carbonate ecosystems. It is expected that outcomes of this project will significantly advance our understanding of the drivers of the dissolution of CaCO₃ in sediments and the functioning of globally important carbonate ecosystems.

DP150101904 Gard, Dr Michael; Lupton, Prof Deborah A; Leahy, Dr Deana N; Pluim, A/Prof Carolyn J

2015 \$50,000.00

2016 \$67,100.00

2017 \$60,000.00

Total \$177,100.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation Southern Cross University

Project Summary

While there is growing enthusiasm for using digital technology in school health and physical education (HPE), this is happening in the absence of systematic empirical research. This project aims to describe the forms digital HPE is taking, analyse the commercial and ideological forces shaping it, and discuss its impacts. It aims to provide educational stakeholders with a knowledge base on which to anchor debate, policy and further research concerning the complex ethical and philosophical issues raised by the digitisation of HPE. As the first HPE research grounded in theories of digital culture, the project also aims to challenge the intellectual foundations of HPE teacher training as well as widely held views about the public health role of schools.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103286 Sanders, Dr Christian J; Santos, A/Prof Isaac R; Sachs, Prof Julian P

2015 \$138,000.00

2016 \$82,000.00

2017 \$57,187.00

Total \$277,187.00

Primary FoR 0503 SOIL SCIENCES

Administering Organisation Southern Cross University

Project Summary

The aim of this project is to investigate carbon burial in mangroves during current and historical climatic conditions through in depth dating methods and paleoclimate reconstructions. The project intends to use state-of-the-art radionuclide tracer technologies to determine system scale aspects of the mangrove carbon budget, i.e. burial, tidal export and respiration. This project is significant because it aims to delineate how climatic conditions are directly related to the mangrove carbon budget. Further, the site specific data on historical mangrove carbon burial could allow adaptation strategies for use of coastal wetland habitats that sequester CO₂, a natural means to help ameliorate greenhouse gas, as support for mangrove forest protection and restoration.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of New England

DP150103591 Andrew, Dr Rose L; Borevitz, A/Prof Justin

2015	\$140,000.00
2016	\$158,200.00
2017	\$125,000.00
2018	\$41,888.00
Total	\$465,088.00

Primary FoR 0604 GENETICS

Administering Organisation The University of New England

Project Summary

This project aims to map the sources of adaptive alleles underlying diversification is to reveal insights into the mechanisms of speciation. The source of the raw material for evolution can have significant impacts on the speed with which populations can adapt. An emerging pattern in speciation research is the importance of ancient alleles and introgressed genes, which differ in the genomic signatures left by selection. Eucalyptus offers a unique opportunity to explore these modes of evolution using the latest genomic tools. Improving our understanding of adaptation and genetic variation in woodland eucalypts is expected to make a significant contribution to their conservation, management and restoration.

DP150102441 Coventry, Dr William L; Byrne, Em/Prof Brian J; Olson, Prof Richard K

2015	\$90,000.00
2016	\$52,700.00
2017	\$60,000.00
Total	\$202,700.00

Primary FoR 0604 GENETICS

Administering Organisation The University of New England

Project Summary

This longitudinal behaviour-genetic study of the National Assessment Program – Literacy and Numeracy (NAPLAN) results at Grades 3, 5, 7 and 9 will continue to document the influence of genes and environmental factors on individual differences in school achievement. It aims to strengthen the longitudinal aspects of the data, allowing the project to identify sources of stability and change across the seven school years of the NAPLAN. It also aims to increase numbers in the low and high tails of the score distributions, creating a clearer picture of deficits like dyslexia and dyscalculia, and allow for firmer identification of gene-by-environment interactions. The project aims to further illuminate any differential effectiveness of schools and teachers on student outcomes, a topic of high public interest.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101867 Du, Prof Yihong

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
2018	\$105,000.00
Total	\$415,700.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of New England

Project Summary

Cutting edge nonlinear mathematics is required to understand many important propagation phenomena in nature, such as the spreading of invasive species or nerve signals. This project aims to systematically investigate nonlinear partial differential equation models that govern the dynamics of such propagations, with emphasis on the development of new approaches that enable deeper insights on the evolution of the propagating fronts. The project aims to develop new mathematics for new applications of lasting values.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of New South Wales

DP150101292 Aggleton, Prof Peter J; Rasmussen, A/Prof Mary Louise; Cover, Dr Rob; Marshall, Dr Daniel L

2015 \$151,000.00

2016 \$146,700.00

2017 \$118,000.00

Total \$415,700.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation The University of New South Wales

Project Summary

In the context of well-documented threats to the mental health and well-being of minority young people, this project will examine the experiences of two different generations of gender and sexual minority youth growing up in Australia, and the sources of support they have found most useful. Innovative contextual analysis will involve documentary and archival research alongside individual and group interviews. Through a focus on the promotion of well-being and participatory citizenship in a rapidly changing social world, the findings aim to contribute new theory concerning transitions from youth to adulthood, improved methodology for the study of marginal and sometimes hard-to-reach populations, and better quality policy and practice.

DP150102038 Ballard, Prof Bill J; Wade, Prof Claire M

2015 \$130,000.00

2016 \$119,900.00

2017 \$125,000.00

Total \$374,900.00

Primary FoR 0604 GENETICS

Administering Organisation The University of New South Wales

Project Summary

In 1868 Charles Darwin proposed that the process of domestication can be divided into two independent selective processes we now call unconscious and artificial selection. In this project, we include the Australian dingo as a functional intermediate between the wild wolf and domestic dogs and test Darwin's hypothesis using modern molecular and statistical techniques. It is now widely accepted that the dingo was not domesticated by indigenous Australians and is therefore the ideal extant population for the project. The project is significant because it will be a critical test of Darwin's hypothesis. The outcome could be an improved understanding of the genomic basis for selection that can inform the process of domestication.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103100 Bao, Prof Jie; Skyllas-Kazacos, Prof Maria; Agelidis, Prof Vassilios G

2015	\$130,000.00
2016	\$101,700.00
2017	\$109,000.00
Total	\$340,700.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to develop a new control approach to distributed energy storage at stack, system and microgrid levels, utilising one of the most promising flow battery technologies - vanadium redox batteries. This is the first attempt of a storage centric approach that includes: an integrated approach to design and control of vanadium flow batteries with novel advanced power electronics technologies to achieve optimal charging/discharging conditions; and, a scalable distributed energy storage and power management approach incorporating energy pricing for storage dispatch that allows distributed autonomous controllers to achieve optimal local techno-economic performance and microgrid-wide efficiency and reliability.

DP150101492 Belmessous, Dr Saliha

2015	\$59,117.00
2016	\$76,300.00
2017	\$58,086.00
2018	\$61,220.00
2019	\$78,931.00
Total	\$333,654.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project aims to challenge long-held ideas about empire and the role of subject peoples. It endeavours to question the view that resistance was the obvious way in which colonised peoples responded to European domination. It is designed to explore the proposition that colonised peoples engaged with empire, its structures and values in more complex and various ways than has been assumed. Individuals and communities worked inside the structures of imperial rule and identified opportunities whereby they could improve their lives and work towards their emancipation and that of their communities. This project will focus on the entire period of French rule in Algeria (1830 to 1962).

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102966 Benatallah, Prof Boualem; Yang, Prof Jian; Papazoglou, Prof Michael P

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$369,900.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation The University of New South Wales

Project Summary

Cloud computing allows organisations to expand or contract their computing footprint based on existing demand. However, existing cloud delivery models support individual segregated and heterogeneous functionalities, which prevent effective coordinated combination of on-premise and off-premise applications, services, and resources. This project aims to significantly contribute to the scientific foundations for the model-driven and elastic configuration and orchestration of resources over heterogeneous cloud services. The outcomes of the project aim to contribute to lifting productivity and economic growth through interoperable and elastic cloud service technologies as well as delivering appropriate skills for the new digital economy.

DP150100446 Bradford, Prof Mark A

2015	\$130,000.00
2016	\$134,300.00
2017	\$140,000.00
2018	\$130,000.00
2019	\$130,000.00
Total	\$664,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to investigate the capacity of high-strength steel (HSS) flexural members by undertaking physical tests and numerical simulations, and proposes to craft innovative overarching design guidance for them within a paradigm of Design by Advanced Analysis. HSS structures are significant as they are lighter than their mild steel counterparts and so use less material, with a much lower carbon footprint. Modern metallurgical process can produce HSS of Grade 1000 Megapascals or higher, but there is no specific structural code governing their design. Surprisingly little research has been reported on HSS flexural members which fail by lateral buckling, and this is the focus of the project, filling the gap needed to produce an advanced design standard.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100676 Brooks, Prof Robert C; Garratt, Dr Michael

2015	\$204,385.00
2016	\$172,800.00
2017	\$184,323.00
Total	\$561,508.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

The proposed project investigates how males affect the lifespan, ageing and subsequent reproduction of their mates. It seeks to draw on and adapt tools and approaches used in molecular genetics and physiology to test predictions from evolutionary theories of sexual conflict, life-histories and ageing in an organism of biomedical and ecological significance, the house mouse. It is expected that this approach will allow the study, in unsurpassed detail, of the costs males impose on females via mating, insemination, territoriality and via conflict over how many offspring to have and how to invest in their care.

DP150102326 Brown, Dr Mark V; Ostrowski, Dr Martin L; Bodrossy, Dr Levente; Beman, Asst Prof John M; Fuhrman, Prof Jed A

2015	\$170,000.00
2016	\$182,200.00
2017	\$180,000.00
Total	\$532,200.00

Primary FoR 0405 OCEANOGRAPHY

Administering Organisation The University of New South Wales

Project Summary

From the reef to the rainforest, Australia is famous for its unique biodiversity. Less well known is that Australia's coastline is predicted to be a global hotspot for biodiversity in marine microbes, the unseen life forces that maintain ocean health and productivity. This project aims to overcome historical technological and logistical hurdles by using cutting-edge sampling, genetic and modelling tools to provide the first models of microbial diversity patterns and organismal range in Australian marine systems. This is expected to be a crucial step for understanding the evolutionary and ecological processes that shape contemporary biodiversity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100244 Cavicchioli, Prof Ricardo; Raftery, A/Prof Mark J; Papke, A/Prof Robertson T

2015	\$173,000.00
2016	\$158,200.00
2017	\$198,000.00
2018	\$166,000.00
2019	\$140,000.00
Total	\$835,200.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

The proposed research aims to define mechanisms of survival and speciation that underpin the capacity of a novel group of Antarctic microorganisms to evolve dominance in their very cold (-20 degrees Celsius) and very salty environment. Most (~85 per cent) of the Earth's biosphere is cold (<5 degrees Celsius), and yet contains a rich diversity of microorganisms of which we know little. The uniqueness and sensitivity of Antarctica particularly demands that we rapidly improve our understanding of its biology. The discoveries made could provide fundamental insight about speciation - processes controlling which life forms that colonise the planet.

DP150104485 Chen, Prof Vicki

2015	\$140,000.00
2016	\$119,900.00
2017	\$130,000.00
Total	\$389,900.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Carbon capture and storage (CCS) is one of the defining technological challenges in today's industry and society. Primary sources of carbon dioxide (CO₂) are due to energy generation using fossil fuels as well as key manufacturing activities such cement production and steel making. This project aims to focus on novel approaches to enzyme mediated membrane contactor systems to create robust, high efficiency CO₂ capture from post-combustion and other gas emissions and conversion into useful chemical feedstock. Enzyme immobilisation and stabilisation are expected to be enhanced using functionalised nanoparticles and nanostructured membranes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100516 Clifford, Prof Colin W; Watson, Dr Tamara L

2015	\$110,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$50,000.00
Total	\$395,100.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

It is well known that expectation plays a large role in how we perceive the sex, age and other attributes of people, crucial to guiding our interactions with them. It has not yet been established whether expectation exerts its influence at a perceptual or cognitive level. This project will apply a mathematical model of the way in which expectation can influence perception to a range of judgements made by participants under conditions of uncertainty. The model aims to allow the description of how such expectations influence perception of attributes such as sex, age and attractiveness, in order to generate understanding of a key aspect of person perception and provide a novel theoretical foundation for further research.

DP150101282 Craig, Prof Jocelyn (Lyn) P

2015	\$147,000.00
2016	\$122,800.00
2017	\$120,000.00
Total	\$389,800.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of New South Wales

Project Summary

Australian families report very high time stress. This project explores links between parental time pressure, health and wellbeing, innovatively capturing individual, family and social perspectives. Using new measures, it analyses time diary data from ten countries to discover how amount, composition and gender share of work-family time affect parents' time quality and healthy activities across different societal contexts. It also examines whether there are differences in outcomes by socio-economic status and family structure, in Australia and cross-nationally. The results are expected to inform policy, to promote health and wellbeing, and to encourage sustainable employment-childcare practices.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103503 Crossley, Prof Merlin; Mackay, Prof Joel P

2015	\$141,000.00
2016	\$138,100.00
2017	\$149,000.00
Total	\$428,100.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

Although it is well established that gene expression is closely correlated with DNA methylation, its role in regulating the activity of DNA-binding proteins remains unclear. It has recently been shown that Krüppel-like transcription factors (KLF) have distinct binding preferences for methylated DNA sequences. This project aims to investigate how the activity of transcription factors is dependent upon targeting of methylated DNA by defining the genome-wide set of sites and structural domains critical for binding. It also will explore the functional significance of these sequences using assays that investigate the importance of DNA methylation in KLF mediated cellular reprogramming to the pluripotent state.

DP150102580 Curmi, Prof Paul M; Scholes, Prof Gregory

2015	\$120,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$374,700.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

The strange phenomena of quantum mechanics were not expected to play a direct role in life, however, it appears that quantum effects may be important in the efficient capture of sunlight for photosynthesis. The conditions for the emergence of quantum phenomena appear to be set by the structures of proteins. The aim of this project is to relate protein structure to the emergence of quantum effects in the light harvesting proteins of marine algae. Understanding the link between structure and quantum effects could improve our knowledge of how nature achieves its remarkable efficiency in utilising the energy from the sun. This is likely to foster new technologies that improve the efficiency of solar energy systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101770 Dick, A/Prof Josef; Kuo, Dr Frances Y; Sloan, Prof Ian H; Giles, Prof Michael B; Griebel, Prof Michael

2015	\$140,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$375,100.00

Primary FoR 0103 NUMERICAL AND COMPUTATIONAL MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

High dimensional problems (problems in which there are hundreds or thousands of continuous variables) arise in many applications, from ground water flow to mathematical physics and finance. They typically present major challenges to computational resources and serious mathematical challenges in devising new and improved methods and in proving that they are effective. The aim of this project is to develop new computational methods and theory for high dimensional problems, and to apply these methods to significant applications. The results are expected to allow faster and more accurate solution of problems of growing importance.

DP150101331 England, Prof Matthew H; Sen Gupta, Dr Alexander R; Santoso, Dr Agus; McGregor, Dr Shayne; Ummenhofer, Dr Caroline C; Cai, Dr Wenju; Timmermann, Prof Axel

2015	\$220,000.00
2016	\$191,400.00
2017	\$210,000.00
Total	\$621,400.00

Primary FoR 0405 OCEANOGRAPHY

Administering Organisation The University of New South Wales

Project Summary

Variability in the Pacific Ocean has a profound impact on global climate. Recent unprecedented decadal variability in the Pacific has been linked to global temperature trends and extremes, yet little is known about what drives this variability or its impact on regional climate. This project will combine observations, advanced coupled climate models and ocean-atmosphere dynamical theory to quantify remote drivers of Pacific Ocean variability on interannual-decadal time-scales. This project aims to enhance our understanding of the modes of variability operating in this region and their impact on global and Australian climate. This will have significant benefits for the many sectors of society reliant on interseasonal-decadal climate prediction.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103290 Ferry, Prof Michael; Birbilis, Prof Nick; Laws, Dr Kevin J

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Lightweight alloys with high specific-strength are an essential prerequisite in modern and future technologies. To be useful, they must also possess ductility and inherent corrosion resistance. The latter two properties, however, are inversely correlated with strength. This project proposes to break this paradox - not only in terms of a paradigm change regarding multi-property alloy design - but as applied to the most lightweight engineering alloy system in existence, Magnesium-Lithium (Mg-Li), for which the impact on specific properties is immense. The aim is to develop ultra-lightweight Mg-Li based alloys with formidable property profiles via alloy design and thermomechanical processing. The expected outcome is a new class of structural corrosion resistant metal.

DP150102753 Field, Dr Judith H; Summerhayes, Prof Glenn R

2015	\$183,136.00
2016	\$148,800.00
2017	\$153,152.00
Total	\$485,088.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The University of New South Wales

Project Summary

Around 50 000 years ago, people crossed the Wallace Line and set foot on Sahul (Pleistocene Australia-New Guinea) for the first time. Rapid dispersal across the Sahul continent followed during a period of climatic deterioration. Subsequent human impacts on the landscape are well preserved in the fossil record, particularly plants. This project aims to implement an archaeological and palaeobotanical approach to investigate the temporal and spatial patterning of landscape use through a period of climatic change in the Late Quaternary. The results are expected to provide a fuller understanding of the subsistence strategies and dynamics of human responses to climate change over long time periods.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101405 Flambaum, Prof Victor

2015	\$126,000.00
2016	\$117,000.00
2017	\$122,000.00
2018	\$122,000.00
2019	\$122,000.00
Total	\$609,000.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The University of New South Wales

Project Summary

The project aims to contribute to both fundamental science and its applications. The project proposes new ideas, methods and calculations to test unification theories using effects of violation of the fundamental symmetries P, T, Lorentz symmetry and the equivalence principle in atomic and molecular phenomena, and to search for space-time variation of the fundamental constants across the Universe using both astrophysical observations and laboratory experiments. The outcomes of this project may lead to the proposal of new atomic, nuclear and molecular clocks and the calculations needed to estimate and improve the accuracy of these clocks.

DP150102368 Fletcher, Prof John E; Dutta, Dr Rukmi D

2015	\$95,000.00
2016	\$91,100.00
2017	\$95,000.00
Total	\$281,100.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The key aim of this project is to develop an electrical drive system with enhanced tolerance to system faults. The research is significant as it aims to satisfy the demands of emerging high-reliability applications for electric drive systems utilising a patented concentrated-wound permanent magnet machine. Applications for the research include the automotive, aerospace and resource sectors which are global growth sectors. A new high-quality model of the machine is expected to be realised. This new model is proposed to then inform the development of suitable control techniques for the machine driven by fault-tolerant inverter topologies. The research is then planned to be demonstrated on prototype research machines and the system performance compared with existing state-of-the-art technology.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100989 Forgas, Prof Joseph P

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$50,000.00
2019	\$50,000.00
Total	\$395,900.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Although affect plays a major role in human affairs, the psychological mechanisms linking affect to thinking and behaviour remain incompletely understood. This project will investigate the influence of affective states on implicit cognitive processes and subsequent social behaviours. The project aims to develop and to test an innovative information processing theory linking affect to implicit cognition, and apply new experimental methods to measure the cognitive and behavioural consequences of affect. Studies will also explore the applied consequences of affect infusion for real-life social behaviours with expected implications for health, clinical, organisational, and educational outcomes.

DP150104156 Foster, Prof Neil R; Yun, Prof Jimmy S; Cao, Prof Dapeng

2015	\$140,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$375,100.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The aim of this research is the utilisation of gas expanded liquids (GXLs) in technology platforms based on the principles of process intensification (PI). In order to facilitate the attainment of project objectives a comprehensive investigation of the fundamental properties of GXLs, and their interactions is proposed. A significant component of the programme is expected to be to use the knowledge obtained to facilitate the development of scale-up protocol for PI based methodologies, with particular emphasis on the production of biomaterials. GXLs technology is frontier technology with regard to the biomaterials sector.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104107 Foster, Prof Stephen J; Valipour, Dr Hamid

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

In January 2014 the draft Australian Standard for the design of concrete bridges was released; this is the first standard in Australia, and one of the first in the world, to include design procedures for steel fibre reinforced concrete (SFRC) in a comprehensive way. While rules have been introduced for flexure and shear, strict limitations are placed on application where large plastic rotations are expected. This study investigates the moment-rotation performance of SFRC beam-column connections containing economical fibre dosages. The study is expected to provide data on the post-ultimate behaviour and robustness of SFRC moment hinges and determine moment-rotation relations for adoption by engineers and Standards bodies.

DP150100830 Fox, Prof Kevin J; Diewert, Prof Walter E

2015	\$100,000.00
2016	\$131,400.00
2017	\$128,000.00
2018	\$130,000.00
2019	\$62,000.00
Total	\$551,400.00

Primary FoR 1401 ECONOMIC THEORY

Administering Organisation The University of New South Wales

Project Summary

Significant problems exist in the measurement of productivity and hence its understanding, impeding informed policy formulation. This project aims to advance new concepts and methods for productivity measurement that have the potential to improve policy and national welfare, with special attention to: productivity in the mining industry, which has been a particular problem for Australia; the increased holding of precautionary cash balances by firms during financial crises, representing underutilised resources; examination of firm productivity dynamics, without assuming the possibility of disappearing technology capability that is used in standard models; and a more realistic approach to capitalisation of research and development and other intangible investments.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104054 Freestone, Prof Robert; Hu, Dr Richard Y; Davison, Dr Gethin T

2015 \$108,982.00

2016 \$75,600.00

Total \$184,582.00

Primary FoR 1205 URBAN AND REGIONAL PLANNING

Administering Organisation The University of New South Wales

Project Summary

This project links planning policy, urban design and planning history. It assesses the contribution of design-led policy to reconciling private ambitions for economic growth with aspirations for quality public outcomes in the planning approval processes for major commercial development in the Sydney Central Business District (CBD). Concentrating on the past decade, it aims to examine the changing economic structure of the CBD, linking the changing form of the city to evolving design policies. It seeks to recover the experiences of participants in the development approval process and communicate instructive stories of the complex intersection between market forces and design regimens.

DP150100017 Froyland, Prof Gary A; Dellnitz, Prof Dr Michael; Junge, Prof Dr Oliver; Quas, Prof Anthony

2015 \$85,000.00

2016 \$81,500.00

2017 \$85,000.00

Total \$251,500.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

Coherent structures in geophysical flows play fundamental roles by organising fluid flow and obstructing transport. For example, ocean eddies strongly influence the transportation of heat, nutrients, phytoplankton, and fish larvae, in both the horizontal and vertical direction. Many coherent structures are very difficult to detect and track by direct measurement (for example satellite observations), and current mathematical techniques cannot provide an adequate global description. This project aims to create innovative new mathematical theory and numerical methods to discover and track coherent structures over time frames of physical importance, contributing significantly to our understanding of their role in the oceans' biosphere and climate.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103065 Gooding, Prof John J; Ciampi, Dr Simone

2015	\$170,000.00
2016	\$124,700.00
2017	\$125,000.00
Total	\$419,700.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of New South Wales

Project Summary

Electrochemistry requires each electrode to be connected to the external circuit by a wire. With many electrodes this means many wires. Wires limit electrode density in arrays and dictate that the electrode architecture must be predetermined. This project aims to remove the need for a wire for each electrode by using light to sequentially connect each electrode to a single wire. This will be achieved using modified silicon electrodes where irradiating with light causes an increase in conductivity at the illumination spot. The project will explore the variables that influence the spatial resolution and apply the ideas to making soft connects for nanoelectronics and making high density electrode arrays for electroanalysis.

DP150102893 Greenhalgh, Dr Elizabeth P

2015	\$42,133.00
Total	\$42,133.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

Fighting during 1915 on the Western Front and on Gallipoli marked a pivotal change in the First World War. No longer a war of movement, fighting became the static trench warfare that lasted until 1918. France's army carried the largest burden, yet 1915's battles are little known, lacking the dramatic impact of 1914's Battle of the Marne or 1916's iconic ten-month battle at Verdun. This project aims to examine the crucial place of the 1915 fighting in the process of learning how to engage and defeat so proficient an army as that of Germany. Rather than offering plain battle history, it aims to explore the processes and methods involved in avoiding earlier disasters and in finding the strategy for victory in a modern industrial war.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104169 Greiner, Dr Ben; Foster, Dr Jennifer R; Frijters, Prof Paul; Ambrus, A/Prof Attila

2015	\$79,000.00
2016	\$74,800.00
2017	\$78,000.00
Total	\$231,800.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of New South Wales

Project Summary

Free-riding and rent-seeking, such as tax avoidance and nepotism, are group-undermining activities that societies including Australia continuously struggle with. The aim of this project is to develop a fuller understanding of how to protect human groups from these socially damaging group-related behaviours. Drawing on a conceptual grounding that combines ideas from across social science, the project aims to implement a suite of economic experiments to develop a view of humans' cooperative behaviour that unites several strands of economics literature and offers new insights about how institutions that counter free-riding and rent-seeking arise and are maintained.

DP150100237 Hamilton, Prof Alexander R; Culcer, Dr Dimitrie M; Ritchie, Prof David A; Winkler, A/Prof Roland

2015	\$170,000.00
2016	\$153,400.00
2017	\$150,000.00
2018	\$140,000.00
Total	\$613,400.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of New South Wales

Project Summary

Most electronic devices are powered by conventional transistors that use a 50 year old technology which is nearing the end of its lifetime. Spin-based electronics uses the electron's spin instead of its charge to store, process and transfer information. Although half of all transistors on a chip use holes, almost all research has focussed on electrons. Holes have completely different spin properties than electrons and are predicted to have significant advantages for spin based quantum information processing. This project aims to develop single hole quantum dots, test theoretical predictions of the superiority of holes over electrons and develop new techniques for all-electrical spin manipulation.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104514 Harmon-Jones, Prof Eddie

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

The project will test the idea that high approach-motivated positive emotions (desire, determination) will intensify anger, whereas low approach-motivated positive emotions (satisfaction, amusement) will reduce anger. Anger and high approach-motivated emotions are similar in that they impel the person to move toward, or to approach. Thus, high approach-motivated positive emotions may blend with anger and make it more intense. The project is significant because it aims to suggest, contrary to past ideas, that some positive emotions may increase anger. The project is innovative conceptually and methodologically as it aims to reveal that some positive emotions may increase anger-related responses.

DP150101689 Harvey, Dr David M

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

The project aims to develop new algorithms for counting the number of solutions to polynomial equations in several variables. This fundamental counting problem appears in many areas of mathematics and computer science, such as number theory and cryptography. The aim of the project is to develop algorithms that are more efficient and that are able to handle much larger problems than existing algorithms. The new algorithms are expected to have applications to the numerical investigation of important unsolved problems in number theory, such as the Sato-Tate, Lang-Trotter and Birch-Swinnerton-Dyer conjectures.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104393 Hawkes, A/Prof Evatt R; Chen, Dr Jacqueline H

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to reveal the mechanisms of ignition and flame stabilisation in the temperature and pressure conditions that exist in diesel engines, understanding of which is currently very limited despite their significant bearing on pollutants and fuel efficiency. Using massively parallel supercomputing resources, the most detailed, direct numerical simulations of ignition and flame stabilisation to date will be performed - they will be three-dimensional and use a detailed chemistry model able to account for low-temperature kinetics and two-stage ignition. Analysis of these data aims to reveal how ignition and flame stabilisation depends on key turbulence and chemical kinetic parameters, thus contributing to developing low-emissions diesel engines.

DP150104395 Hawkes, A/Prof Evatt R; Kook, Dr Shawn; Chan, Dr Qing Nian

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to advance the fundamental understanding of flame-wall interactions in diesel engines, which is currently very limited despite the wall's significant impact on combustion and pollutants. The aim is to perform the most comprehensive set of measurements to date in a high-pressure chamber and optically accessible engine, including planar imaging of key species and soot, and space-/time-resolved measurements of wall temperature. These are intended to be complemented by the first transported probability density function modelling of a diesel spray flame that includes soot, radiation and wall heat transfer. The expected outcomes will greatly advance understanding of flame-wall interactions, thus contributing to the development of cleaner and more efficient engines.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101094 Hayes, Prof Brett K; Dunn, Prof John C

2015	\$148,728.00
2016	\$148,100.00
2017	\$160,041.00
2018	\$77,340.00
Total	\$534,209.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of New South Wales

Project Summary

This project aims to answer the most important unresolved question in the psychology of reasoning; how many distinct cognitive processes underlie human reasoning? To answer this question, this project aims to conduct an extensive experimental investigation of the factors that selectively impact inductive and deductive inferences and the application of high-dimensional state-trace analysis; a powerful new method for diagnosing underlying processes from behavioural data. The project is expected also to develop a new computational model that accounts for both inductive and deductive forms of reasoning.

DP150104649 Hoffman, Prof Mark J; Jones, A/Prof Jacob L; Roedel, Prof Juergen

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$369,900.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to achieve a fundamental understanding of the fatigue behaviour of lead-free piezoelectric ceramics which achieve high strain through phase transformations and then ascertain the effects of this behaviour on material degradation rates. The expected outcomes will facilitate replacement of toxic lead in commodity electronics. The focus will be on new lead-free bismuth-alkali-based piezoelectric ceramic systems which demonstrate exciting potential as alternate materials to lead zirconate titanate (PZT) materials. Successful optimisation of the materials' design and knowledge of their degradation rates are expected to facilitate their commercialisation through a profound reduction in the environmental challenges associated with manufacture and disposal of devices.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104754 Housley, Prof Gary D; Lovell, Prof Nigel H; Klugmann, A/Prof Matthias

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

This project aims to determine the underlying mechanisms by which DNA and other molecules are able to migrate across the cell membrane in response to highly localised electric fields. It has recently been shown that focusing of electric fields at the cellular level, using an array of small electrodes, results in unexpectedly high cell transfection efficiencies. It has been termed 'close-field electroporation'. Here it is proposed to establish the properties of the electric fields around cells and cell membrane interactions with these fields that enable molecular translocation. This fundamental science could have broad implications in the domains of drug delivery, gene therapy and neural stimulation.

DP150100910 Hughes, Dr Caitlin E; Ritter, Prof Alison; MacCoun, Prof Robert; Weatherburn, Dr Donald J

2015	\$50,000.00
2016	\$64,500.00
Total	\$114,500.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation The University of New South Wales

Project Summary

Drug law enforcement efforts have been underpinned by the assumption that police deter or prevent drug use and trafficking, yet deterrent effects have gone unexamined or measured using narrow parameters. By using modern criminological conceptualisations of deterrence and innovative methods, this project aims to measure the deterrent effects of four Australian policing strategies on current and would-be offenders' decisions to use, possess and traffic illicit drugs and identify mechanisms by which police can and cannot deter. The project aims to provide detailed empirical insight into an enduring policy conundrum, namely the extent to which police can be expected to deter, and build capacity for more evidence-informed responses to drug-related crime.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103272 Johnston, Prof Emma L; Thompson, Prof Richard C; Carter, Dr Elizabeth A

2015	\$150,000.00
2016	\$143,900.00
2017	\$145,000.00
2018	\$100,000.00
Total	\$538,900.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Administering Organisation The University of New South Wales

Project Summary

Using trophic ecological theory as a framework, this project aims to provide the first comprehensive assessment of the fate and effects of microplastics. Plastic pollution is a persistent and increasing problem. Plastics are degraded into small particles, called microplastics, which are ingested by animals. The project aims to develop much-needed techniques to measure microplastics in biological tissue and apply these techniques in food web studies to determine the capacity of microplastics to transfer from the environment into animals, and how microplastics move through a food web to affect biological diversity and animal health. This information will be used to complete the first risk assessment for microplastics in a major coastal habitat.

DP150102779 Kable, Prof Scott H; Schmidt, Prof Timothy; Osborn, Dr David L; Taatjes, Dr Craig A; Stanton, Prof John F; Heard, Prof Dwayne E; Whalley, Dr Lisa K

2015	\$200,000.00
2016	\$148,600.00
2017	\$155,000.00
2018	\$145,000.00
Total	\$648,600.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of New South Wales

Project Summary

Reactive intermediates are the key species that determine outcomes of the chemical reaction networks in atmospheric and combustion chemistry. However, most reactive intermediates remain undiscovered. The project aims to discover these intermediates using laser spectroscopy. Current models of atmospheric chemistry cannot account for the carbon balance over forests, nor the formation of secondary organic aerosols. Combustion models struggle to predict how next-generation fuels burn in modern engines. The successful discovery of these intermediates would allow models to be more accurate and predictive. This will allow scientists, engineers and policy makers to make more informed decisions about atmospheric processes and design more efficient new fuels.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104321 Ke, Dr Yazi D; van Eersel, Dr Janet; Fath, Dr Thomas; Gunning, Prof Peter W

2015	\$172,000.00
2016	\$129,500.00
2017	\$144,000.00
Total	\$445,500.00

Primary FoR 1109 NEUROSCIENCES

Administering Organisation The University of New South Wales

Project Summary

The aim of this project is to study LIM domain kinase 1 in neuronal function, using cell and mouse models. Unrestricted brain function is essential to one's wellbeing and the ability to perform normally. Critically contributing to the function of neurons is a cytoskeleton which maintains morphology and function. However, molecular mechanisms underlying cytoskeletal dynamics are poorly understood. LIM domain kinase 1, a key regulator of the actin cytoskeleton decreased with age and its loss associated with deficits in memory and neuronal morphology. This project could reveal fundamental processes regulating and maintaining brain function.

DP150104630 Kohn, Prof Robert J; Fiebig, Prof Denzil G; Carter, A/Prof Christopher K

2015	\$108,412.00
2016	\$107,500.00
2017	\$117,669.00
Total	\$333,581.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation The University of New South Wales

Project Summary

This project aims to develop flexible and powerful methods for estimating models containing variables that are unobserved, that is, latent. Such models are often used to capture individual heterogeneity and time dependence in data collected on individuals, with each individual observed for several time periods. Latent variables can also infer group membership, where such membership is unavailable from the data. The intended methodology is Bayesian and based on new particle methods that allow users to select between models and predict future observations even in complex situations. The research aims to inform decision making through improved use of data in health economics and related fields.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103006 Li, Prof Sean S; Koumoto, Prof Kunihito

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Waste heat, which is discharged into the environment from industrial plants and vehicle exhausts, represents a huge amount of lost energy and is a major contributor to global warming. Thermoelectric materials, which can generate electricity from the waste heat, could play an important role in a global sustainable energy solution while reducing greenhouse emissions. This program is aimed at experimental and theoretical development of new concepts to engineer the interfaces with various atomic stacking sequence of two complex oxides and also the three-dimensional binary nanocube superlattices to enhance the energy conversion efficiency of oxide based thermoelectric materials by several times over today's state-of-the-art.

DP150102728 Lin, Prof Xuemin; Zhang, Dr Wenjie

2015	\$130,000.00
2016	\$128,500.00
2017	\$139,000.00
Total	\$397,500.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation The University of New South Wales

Project Summary

Advances in electronic data collections are leading to an exciting new research area - Big Data. Driven by a number of key applications, this project aims at a major field in Big Data: pattern-based structure matching. The problems involved are computationally hard (NP-Complete or NP-Hard). The investigation aims to cover the three key components: fundamentals, indexing, and query processing. The anticipated outcome includes a set of new theorems and novel data processing techniques. If successful the project is expected to significantly contribute to technology development and the scientific foundations of Big Data analysis.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101024 Livingston, Dr Michael J; Room, Prof Robin G; Chikritzhs, Prof Tanya; Lloyd, Dr Belinda; Dietze, Prof Paul M

2015	\$104,000.00
2016	\$80,600.00
2017	\$90,000.00
Total	\$274,600.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation The University of New South Wales

Project Summary

This project aims to provide critical insight into recent trends in alcohol consumption and related harm in Australia. Many indicators of harm from alcohol have increased dramatically in the past decade, while drinking behaviours appear largely unchanged. This project aims to investigate two potential explanations for these trends: that apparent increases in rates of alcohol-related harm are driven by operational or administrative practices rather than by increases in actual harm; and that stable per-capita consumption data obscures divergent drinking behaviours, with increases among heavy drinkers driving increasing harm rates. The project aims to inform alcohol policy debates, which rely on robust trend data.

DP150100226 McDonald, Prof Skye; Rushby, Dr Jacqueline A

2015	\$120,000.00
2016	\$118,900.00
2017	\$129,000.00
2018	\$30,000.00
Total	\$397,900.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Empathy is fundamental to human relations. Despite this, little is known about its underlying mechanisms. This project tests whether empathy relies upon us simulating the emotion of others in ourselves, and if so, at which stage this occurs. It is significant because it tests several competing theories to advance a coherent model of empathy that can be used to understand human social behaviour. It is innovative because it focuses on adults with brain lesions. This is a powerful means to examine brain mechanisms underpinning empathy, yielding insights not available from observation of healthy adults. It is expected to provide a leap forward in understanding the neuroscience of social behaviour.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100300	Michaelsen, A/Prof Christopher; Farrall, Dr Jeremy M; Whalan, Dr Jeni; Prantl, A/Prof Jochen
2015	\$124,193.00
2016	\$119,200.00
2017	\$126,233.00
2018	\$118,777.00
Total	\$488,403.00
Primary FoR	1801 LAW

Administering Organisation The University of New South Wales

Project Summary

This project examines the fundamental problem of how elected members on the Security Council can influence Council decision-making and norm development. Assembling a research team of international lawyers and political scientists, the project seeks to provide a rigorous, multi-disciplinary evaluation of why and when non-permanent Council members have succeeded in having impact on the Council's decision-making process. Drawing on recent experiences of elected members, including Australia, the project is expected to advance evidence-based and empirically grounded policy proposals designed to increase the capacity of elected members to exercise power and influence over the Council's agenda and policy.

DP150101863	Morello, A/Prof Andrea; Milburn, Prof Gerard J; McCallum, A/Prof Jeffrey C; Holmes, Dr Catherine A; Zurek, Dr Wojciech H
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2015	\$140,000.00
2016	\$163,000.00
2017	\$140,000.00
Total	\$443,000.00

Primary FoR 0206 QUANTUM PHYSICS

Administering Organisation The University of New South Wales

Project Summary

This project is aimed at constructing and observing an individual quantum system that can exhibit chaotic behaviour under controllable conditions. It is a long-sought goal of modern physics that can become reality for the first time in the world, thanks to the unique availability in Australia of the most quantum-coherent single spin ever made and a long history of theoretical advances in the field. Turning a spin into a chaotic system will uncover the true nature of the quantum-classical boundary, and verify whether an underlying classical chaotic dynamics ultimately influences the behaviour of quantum systems. It is expected that the discoveries made will illuminate the path towards the technological exploitation of increasingly complex quantum devices.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102417 Munroe, Prof Paul R; Xie, Dr Zonghan; Xu, Prof Jiang

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0913 MECHANICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Coatings are frequently applied to components operating in harsh environments to enhance durability. Often such coatings exhibit low toughness and poor corrosion resistance that leads to premature failure. The aim of this project is to design, characterise and test innovative coatings that exhibit unique architectures based on natural materials such as teeth and nacre. It is envisaged that these coatings will be hard, tough and durable in hostile, corrosive environments, and will thus, transform industries such as manufacturing, mining and offshore oil exploration as well as enhance the lifetime of prosthetic devices.

**DP150103866 Parameswaran, Prof Sridevan; Dempster, Prof Andrew G; Diessel, Dr Oliver F; Cetin, Dr Ediz;
Ambrose, Dr Jude A**

2015	\$110,000.00
2016	\$110,300.00
2017	\$120,000.00
Total	\$340,300.00

Primary FoR 0803 COMPUTER SOFTWARE

Administering Organisation The University of New South Wales

Project Summary

The processing speed, cost and flexibility requirements of future satellite-based applications cannot be satisfied with conventional radiation-hardened processors or custom integrated circuits. This project aims to develop key technology to enable off-the-shelf hardware to be customised for this use without compromising reliability. The project aims to develop the design methods needed to implement a given set of satellite applications on a processing platform composed of application-specific soft processors and accelerator circuits hosted on conventional reconfigurable logic devices. Crucially, the solution architecture is expected to be sufficiently hardened against radiation-induced errors while meeting performance and circuit area constraints.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102582 Pawson, Prof Hal; Hulse, Prof Kathleen J; Randolph, Prof Bill

2015	\$108,594.00
2016	\$118,800.00
2017	\$52,881.00
Total	\$280,275.00

Primary FoR 1205 URBAN AND REGIONAL PLANNING

Administering Organisation The University of New South Wales

Project Summary

With their property acquisition activity reaching record levels, investor landlords are now key players in Australia's housing market. This has sparked vigorous public debate on the contribution of this activity to a 'housing price bubble' and the crowding out of first home buyers. Given new research indicating private rental provision growing fastest in the most disadvantaged neighbourhoods, another effect may be to exacerbate the socio-spatial polarisation of our major cities. This project will therefore investigate the drivers and consequences of growing private rental investment in Australia's major cities, especially in disadvantaged areas. Project findings are expected to inform national housing, planning and urban policy.

DP150103739 Prestage, A/Prof Garrett P; Jin, Dr Feng Y; Zablotska-Manos, Dr Iryna

2015	\$112,494.00
2016	\$103,800.00
Total	\$216,294.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

Current social and political debate about what constitutes legitimate relationships hinge on the status of same-sex relationships. Partner choice is key to understanding individuals' sexual behaviour and the relationships they develop in response. Yet gay and bisexual men's (GBM) sexual partner choices have not been researched. The project aims to describe types of partner choices among GBM and how these affect the specific sex practices, including risk behaviours, in which they engage and their style and pattern of relationships. It also aims to identify the contextual and individual factors associated with these choices. This evidence is expected to inform current debate and help improve health promotion and relationship support work among GBM.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104372 Rahman, Prof Muhammed F

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Sensorless control of interior permanent magnet synchronous machines (IPMSM) has undergone many developments lately. Existing low-bandwidth sensorless controllers have so far limited the use of such controllers to low-performance applications. High-bandwidth position sensing, resulting in the actuating machine to be utilised as its own position sensor, is required in a truly vast range of sensorless and fast responsive electric drive systems in industry. The project's proposed method, demonstrated for the first time in 2013 via modelling, is a new method of high-bandwidth sensorless control of the IPMSM. The project's aim is to fully develop this method via further modelling and experimentation.

DP150100943 Ramer, Prof Rodica; Mansour, Prof Raafat; Sorrentino, Prof Roberto

2015	\$140,000.00
2016	\$116,000.00
2017	\$121,000.00
Total	\$377,000.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of New South Wales

Project Summary

The project aims to develop background theory and microelectromechanical (MEM)-based techniques for monolithic fabrication that integrate highly miniaturised three-dimensional waveguides with MEM systems. These technologies shall be used to design, develop and fabricate reconfigurable millimetre-wave devices. The project aims to bring together micromachining and millimetre-wave circuits to enable the realisation of reconfigurable systems on chip. These technologies offer reduced size, cost and power consumption and high functionality, unachievable with conventional millimetre wave technology alone. The planned outcomes of the project are necessary to satisfy the sharply risen requirements for current and future fourth and fifth generation (4G and 5G) wireless communications systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104835 Richardson, Prof Rick

2015	\$132,000.00
2016	\$126,600.00
2017	\$141,000.00
Total	\$399,600.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of New South Wales

Project Summary

Revealing the 'engram' is one of the greatest challenges neuroscience has faced. Substantial advances have been made in elucidating the mechanisms underlying memories that last for a few hours or days but much less is known about the cellular and molecular processes that mediate memories across remote periods of time. An underutilised approach to this problem is to study forgetting. The infant rat is an ideal model as they typically display good memory for a day or two but forget after a week or more. That is, they exhibit a specific impairment in the maintenance of remote memories. This project aims to determine the molecular/cellular processes underlying infantile amnesia and is expected to provide unique insights into memory processes in general.

DP150104242 Rnjak-Kovacina, Dr Jelena; Lord, Dr Megan S; Whitelock, Prof John M; Kaplan, Prof David L

2015	\$79,477.00
2016	\$79,700.00
2017	\$92,892.00
Total	\$252,069.00

Primary FoR 0903 BIOMEDICAL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

There is currently a pressing, unmet need for biodegradable, functional biomaterials that support endothelial cell interactions and vascular regeneration. Lack of sufficient vascular regeneration is the biggest obstacle in translating advances in biomaterials development to clinical, diagnostic and research applications. This project aims to address this need by developing novel biomaterial platforms that mimic the extracellular matrix of the vascular niche. We plan to utilise unique extracellular matrix domains and bioprinting techniques to control and guide endothelial cell functions. We could thus contribute to the knowledge base in vascular biology and bioengineering, forming the basis for vascular materials of the future.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103699 Rogge, Prof Sven; Klimeck, Prof Dr Gerhard

2015	\$125,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$360,100.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of New South Wales

Project Summary

The high-speed and low-power requirements of state-of-the-art transistors are met by material control that has reached an unprecedented level. The material in a nano-device has drastically different characteristics than in the bulk. To achieve this, the industry needs to implement strain, ultra sharp junctions, and well controlled potential profiles all on the nanometre scale. This project aims to develop a technique to directly measure these properties in an actual device. Electrical and optical atom tomography will make it possible to map device parameters on the atomic scale. This atomistic anatomy has the potential to revolutionise the development of nanoscale devices and grow into a tool for a multi-billion dollar industry.

DP150104123 Russell, A/Prof Adrian R; Muir Wood, Prof David

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to make discoveries for modelling initiation, rate of progression and consequences of seepage induced internal erosion through soils which make up critical water retaining infrastructure like dams. It aims to achieve an understanding of how fundamental microstructural (particle and pore) properties governing erosion have the potential to destroy infrastructure. Major expected outcomes include experimental evidence of governing mechanics, theories which couple microstructure with erosion and models to describe the altered soil strength and stiffness. It aims to lead to increased safety and economic efficiencies in Australia where many tens of millions of dollars are spent each year to reduce risks associated with internal erosion.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102583 Sarker, A/Prof Ruhul A; Coello Coello, Prof Carlos A

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
Total	\$236,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of New South Wales

Project Summary

The purpose of this project is to develop an intelligent framework for the robust configuration of evolutionary algorithms. This research is driven by the fact that the current design of evolutionary algorithms is sub-optimal and ineffective for many problem domains. In the proposed framework, a configuration is evolved while the algorithm is running for problem solving to ensure robust design. Its scientific outcomes are expected to include a novel framework for the automated design of algorithms and new techniques for exploiting assumptions in algorithmic design that may have been overlooked. Expected practical outcomes include the provision of a robust problem-solving tool, strong research training and high-impact publications.

DP150104168 Shannon Weickert, Prof Cynthia; Barry, Dr Guy; Fung, Dr Samantha J

2015	\$105,000.00
2016	\$105,500.00
2017	\$100,000.00
Total	\$310,500.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

New neurons are robustly generated in the subependymal zone (SEZ) during human development. Thus, the SEZ may represent an endogenous modifiable source of neurons to enhance plasticity and therapeutic potential in the brain. However, despite our preliminary data, SEZ neurogenesis beyond the first months of life is controversial. This project aims to understand changes in the capacity for human SEZ proliferation from birth through to ageing and whether neurogenesis may be induced by inflammation in the adult. Using transcriptomics we will also determine how the neurogenic environment changes with age/inflammation. This project is an important step in proving that the brain's potential to generate new neurons extends beyond infancy.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100564 Sivaraman, A/Prof Vijay; Jha, Prof Sanjay K; Ostry, Mr Diethelm; Tsudik, Prof Gene

2015	\$110,000.00
2016	\$98,800.00
2017	\$114,000.00
Total	\$322,800.00

Primary FoR 0803 COMPUTER SOFTWARE

Administering Organisation The University of New South Wales

Project Summary

The aim of this project is to develop new methods to secure the data and context associated with body-wearable health monitoring devices. The novelty of the scheme is in making the methods work on resource-poor devices, by combining new security capabilities derived from the operating environment with conventional cryptographic techniques. This project aims to increase the trust that medical practitioners and insurance providers can place on health data from wearable devices, and showcase Australian innovation in developing world-class security solutions. The outcome of this project is expected to be the development and demonstration of ultra-lightweight algorithms and mechanisms that execute in wearable devices to safeguard the integrity of the data.

DP150103747 Song, Prof Chongmin; Tin-Loi, Em/Prof Francis; Tangaramvong, Dr Sawekchai

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

This project aims to develop, directly from computer-aided design models or digital images, an automatic numerical simulation approach for the safety assessment of engineering structures in three dimensions. Underpinning this novel approach is the proposed use of scaled boundary polytope elements and a complementary octree algorithm for mesh generation. Complex loadings are intended to be addressed effectively by the developed adaptive shakedown analysis leading to factors of safety familiar to engineers and directly usable in design. The expected primary outcome is an innovative technology for numerical simulation and the development of an invaluable numerical tool for the effective safety assessment of engineering structures.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102408 Stocker, Prof Roland; Dawes, Em/Prof Ian W; Clarke, Prof Catherine F; Dallner, Prof Gustav

2015	\$140,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$414,300.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

The aims of this project are to identify how cells regulate the synthesis and the distribution of coenzyme Q between different organelles, and how these processes are affected when cells experience various conditions of stress. Coenzyme Q is a fat-soluble molecule present in all cell membranes and essential for normal cell function. Despite this, relatively little is known about the systems that regulate the synthesis and cellular location of coenzyme Q. The project plans to identify the genes and proteins required for coenzyme Q regulation of sub-cellular distribution in unstressed and stressed cells. In doing so, the project could provide a greater understanding of the ways cells maintain normal coenzyme Q levels and respond to stress.

DP150100498 Stockings, A/Prof Craig A; Fernandes, A/Prof Clinton; Connor, Dr John S; Stanley, Prof Peter A; Cabral, Dr Estevao

2015	\$44,868.00
2016	\$54,500.00
2017	\$40,976.00
Total	\$140,344.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

InterFET was the first international military campaign led by Australia since WW2, and its largest deployment since Vietnam. It also marked a crucial moment in East Timor's transition to independence. Yet there is no significant scholarly research on the troops who served, nor has there been any substantive scholarly analysis of the InterFET deployment itself. The central aim of this project is thus to investigate the latter by means of the former. It aims to provide a substantive scholarly analysis of InterFET primarily through means of an oral history of participants. The project endeavours to dramatically enhance Australian and international understanding of this seminal event and what it signified in military, political, social and personal terms.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100920 Sukochev, Prof Fedor; Potapov, Dr Denis; Dykema, Prof Kenneth J

2015	\$127,000.00
2016	\$121,800.00
2017	\$130,000.00
2018	\$130,000.00
Total	\$508,800.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of New South Wales

Project Summary

This project aims to solve some famous problems concerning eigenvalue decompositions in operator theory through new collaborations and by connecting new areas of mathematics. Eigenvalue decomposition is a central concept in mathematics with many applications in science and engineering. One hundred years since its development, however, it is still not known how to decompose certain important operators that arise in analysis and geometry. The project is expected to provide new technology to achieve this, promising new understanding and new applications.

DP150102656 Suthers, Prof Iain M; Richardson, A/Prof Anthony J; Pakhomov, Prof Evgeny; Baird, Dr Mark E

2015	\$114,977.00
2016	\$111,600.00
2017	\$122,369.00
Total	\$348,946.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation The University of New South Wales

Project Summary

This project aims to develop innovative numerical methods to understand the dynamics, carbon export, and trophic structure of zooplankton. The trophic links between phytoplankton, zooplankton and fisheries are unknown. The size-frequency distribution of zooplankton (size spectrum) is an innovative method for estimating their growth, predation and production as food for fish. Analysis of a global synthesis of zooplankton size distributions from tropical to polar environments are expected to reveal these vital rates of pelagic ecosystems. The zooplankton rates will reveal, for the first time, the link between phytoplankton and fisheries, and will significantly improve ecosystem models and global assessments of environmental change.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100768 Taft, Prof Marcus

2015	\$71,130.00
2016	\$71,200.00
2017	\$76,305.00
Total	\$218,635.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of New South Wales

Project Summary

In order for people to read effectively, the mental representation of each letter-string must be found in long-term memory. The aim of this project is to more fully understand the nature of proficient visual word recognition with a particular focus on the way in which the form of the word is mentally stored and retrieved during the act of reading. A range of issues will be examined from letter position coding through to how words with a complex internal structure are processed, all framed within a unified model of word recognition. An understanding of the mechanisms underlying proficient adult reading is significant and beneficial in that it is expected to provide a framework for guiding both reading acquisition and reading improvement programs.

DP150103034 Thielscher, Prof Michael; Pagnucco, A/Prof Maurice; Schaub, Prof Dr Torsten; Lakemeyer, Prof Dr Gerhard

2015	\$126,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$419,900.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of New South Wales

Project Summary

Robotic systems are becoming increasingly more sophisticated and prevalent. Developing complex and maintainable robot programs to control these systems remains a significant challenge particularly given the diversity of robot platforms and application areas. This project aims to build on advances in problem solving and programming paradigms in Artificial Intelligence, applying them to learning sophisticated robot programs. These techniques have the potential to provide for elaboration tolerance, knowledge/program maintenance and optimisation of performance. This project aims to develop techniques for building sophisticated declarative robot programs. It aims to achieve this by learning procedural robot programs and turning them into maintainable declarative robot programs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103349 Tran-Nam, A/Prof Binh; Walpole, Prof Michael

2015	\$33,359.00
2016	\$69,300.00
2017	\$43,909.00
Total	\$146,568.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation The University of New South Wales

Project Summary

Little is known about the important process of tax dispute resolution in Australia. The project seeks to determine whether tax dispute resolution in Australian is effective, whether or not taxpayers with greater resources come out ahead in tax litigation, and whether or not alternative dispute resolution is a cost effective way for resolving tax disputes. The project also examines the costs and benefits of independent tax dispute resolution, and the legal and justice implications of accessibility to such dispute resolution. Through its analysis, the project aims to arrive at concrete policy recommendations to improve the functioning of the present system in terms of accessibility, operating costs and perceived procedural justice.

DP150101339 Turner, A/Prof Ian L; Middleton, Prof Jason H; Splinter, Dr Kristen D; Reniers, Prof Ad J; Davidson, Dr Mark A; Blenkinsopp, Dr Chris

2015	\$155,000.00
2016	\$158,200.00
2017	\$110,000.00
Total	\$423,200.00

Primary FoR 0403 GEOLOGY

Administering Organisation The University of New South Wales

Project Summary

Coastal erosion is confronting societies and the natural environment. The economic value in Australia of built assets at risk includes roads (\$60 billion), commercial buildings (\$81 billion) and homes (\$63 billion). Hard engineering entire coastlines is rarely feasible, with beaches providing the best coastal defence along the great majority of sandy coastlines. But how wide should a buffer zone be to provide adequate protection from storms? And critically, how reliable are the present modelling tools used to predict this, and can they be improved? Underpinned by innovative field observations to fill fundamental knowledge gaps, this project aims to deliver advanced understanding and the best available solution to storm erosion prediction.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103660 Tyrrell, Em/Prof Ian R

2015	\$70,000.00
2016	\$57,500.00
2017	\$36,634.00
Total	\$164,134.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project addresses current debates over American Exceptionalism (United States historical development considered outside the normal path of history), treating the topic not as a set of substantive empirical propositions to be challenged, but as the cultural and social history of an idea. It aims to show how Exceptionalism evolved, how a cluster of sub-concepts mutually reinforced it and how its attractiveness and its religious, economic and political content changed over time. This approach analyses the historical conditions promoting (and challenging) Exceptionalism as belief and national identity. It bypasses difficult dichotomies between myth and reality and rancorous political arguments for and against the concept.

DP150103016 Valanoor, Prof Nagarajan; Munroe, Prof Paul R; Weyland, A/Prof Matthew; Morozovska, Prof Dr Anna N

2015	\$80,000.00
2016	\$143,900.00
2017	\$150,000.00
2018	\$100,000.00
Total	\$473,900.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

The conventional approach to metal oxide interfaces is 'perfection at all costs' with growth tuned to minimise defects and unwanted chemical intermixing. This project aims to turn this approach on its head by creating interfaces with 'designer defects' that become the critical portion of a functional device. This project proposes that one can promote functionality by making use of new physical properties that arise from the deliberate introduction of structural and electronic mismatches at an interface. Such purposely induced 'designer defects' in epitaxial oxide thin films will allow new properties to be achieved in nanoscale layers. This is expected to lead to a new class of functional materials to be used in sensors and nanoelectronics.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103232 van Dooren, Dr Thom F

2015	\$58,200.00
2016	\$58,500.00
2017	\$30,000.00
Total	\$146,700.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation The University of New South Wales

Project Summary

This project will analyse the cultural and ethical issues that define human interactions with wildlife in the context of environmental and social change. It will fuse ethnography, philosophy and biology in an environmental humanities approach, through comparative studies.

DP150101929 Vandenberg, Prof Jamie I

2015	\$134,064.00
2016	\$134,900.00
2017	\$151,272.00
Total	\$420,236.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of New South Wales

Project Summary

The Kv11.1 voltage-gated potassium channel is an important regulator of cardiac function and a problem for the pharmaceutical industry due to its promiscuity with respect to drug binding. This project aims to investigate how Kv11.1 channels fold and assemble into tetramers and what stabilizes them in the cell membrane. Borrowing from insights gained from the structural analysis of G-Protein coupled receptors, the project intends to apply a novel protein stabilization strategy to facilitate the structural analysis of Kv11.1 channels. The successful completion of the project could reveal important insights into how these molecular machines work as well as enable atomic level studies of how drugs interact and bind to these channels.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102248 Waite, Prof David

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$130,000.00
Total	\$514,700.00

Primary FoR 0402 GEOCHEMISTRY

Administering Organisation The University of New South Wales

Project Summary

This project aims to determine the electron transfer (redox) properties of terrestrially and microbially-derived natural organic matter (NOM) and the implications of these redox characteristics to reactive oxygen species generation, metals transformation and carbon cycling. Experimental and computational studies using model compounds containing quinone and thiol-containing functional groups as well as well-characterised humic substances and algal exudates will be undertaken under both dark and light conditions. Kinetic models of these processes will be developed enabling prediction of the impact of NOM-mediated electron transfer processes on oxidant generation, metals transformation and carbon cycling.

DP150104687 Waller, Prof Steven T

2015	\$90,000.00
2016	\$89,200.00
2017	\$96,000.00
Total	\$275,200.00

Primary FoR 1507 TRANSPORTATION AND FREIGHT SERVICES

Administering Organisation The University of New South Wales

Project Summary

This project aims to address some of the limitations of dynamic transport network modelling in the planning process particularly related to traffic uncertainty, driver adaptivity and information-provision. Previous advances facilitate the proposed methods to introduce; new network routing algorithms that account for numerous increasingly important problem characteristics such as driver route-choice response to real-time information and uncertainty; new formulations for the stochastic dynamic traffic assignment problem which employ the novel routing algorithms as sub-problems; and new methods for relevant bi-level optimisation transport applications such as network design and incident management.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100823 Warton, A/Prof David I

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0104 STATISTICS

Administering Organisation The University of New South Wales

Project Summary

The aim is to develop flexible models for the analysis of high-dimensional count data, in particular, for studying species interactions and the response of communities to environmental factors. This project is significant because increasingly, important research questions are answered using data with many response variables, with a particular need when studying ecological communities and their response to environmental impacts. This project aims to develop the first models that can be used directly to draw valid community-level conclusions for common ecological data types. The expected outcome is a powerful toolset for fully model-based inference from high-dimensional counts, introducing modern approaches to a high-impact area of ecology.

DP150101321 Wiseman, A/Prof Virginia L; Jan, Prof Stephen; Jacobs, Dr Bart; Liverani, Dr Marco

2015	\$310,000.00
2016	\$253,700.00
2017	\$120,000.00
Total	\$683,700.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation The University of New South Wales

Project Summary

This project aims to evaluate equity in health care financing in Cambodia using state of the art methods such as financial and benefit incidence analysis. The project aims to produce novel results by integrating both public and private sectors of the health system, in place of the traditional public sector focus alone thereby enabling a 'whole-system' approach to the assessment of equity in health systems financing. Strengthening the health systems of countries such as Cambodia by developing more predictable and sustainable sources of funding, will not only benefit Cambodia but also enable donors such as Australia to more effectively target their substantial aid investments to promote social and economic stability in the region.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102947 Wolfe, Prof Joe A; Smith, A/Prof John R

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0203 CLASSICAL PHYSICS

Administering Organisation The University of New South Wales

Project Summary

Speech is fundamental to human culture and huge industries exist that analyse, compress, synthesise, transmit and distribute it. Nevertheless, several practical difficulties mean that some key variables and how they interact are only imprecisely known. This project uses an innovative approach for deriving the glottal flow and a new technique for generating precise acoustical flows in model systems to refine the algorithms currently used to relate speech sound to the acoustic flow in the larynx. The project aims to provide the first reliable measurements of the bandwidths of resonances and the acoustical losses in vocal tracts. The results will have practical industrial and, perhaps, clinical applications.

DP150102109 Xue, Prof Jingling

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0803 COMPUTER SOFTWARE

Administering Organisation The University of New South Wales

Project Summary

Current static analysis tools can eliminate many bugs missed by traditional testing but they are still imprecise or inefficient. This project aims to develop precise pointer analyses that enable clients to detect bugs efficiently in large-scale programs in C/C++ and Java, where pointers are used pervasively. The novelty lies in performing these analyses sparsely (allowing data-flow information to move directly from variable definitions to their potential uses) based on Context-Free-Language-reachability (enabling client queries to be answered on-demand). The outcomes aim to significantly improve the reliability and security of industrial-sized software.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101065 Yeoh, A/Prof Guan H; Timchenko, Dr Victoria; Valenzuela, A/Prof Stella M; Cornell, Dr Bruce A; Dombrovsky, Dr Leonid A

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Heat transfer of laser-irradiated nanoparticles in biological tissues requires a basic knowledge of the unique strong resonance absorption properties and a fundamental understanding of the thermal and chemical conversions as a consequence of these heated nanoparticles. This project aims to investigate the extent of the non-equilibrium heating effects of heated nanoparticles on the destruction of biological tissues. Comprehensive experimental studies and computational modelling to be performed are expected to significantly enhance the understanding of laser-induced heating phenomena of embedded nanoparticles in biological tissues and the prediction of the level of destruction that can be experienced by these heated nanoparticles.

DP150100669 Zhang, Dr Jianqiang; Young, Prof David J

2015	\$135,000.00
2016	\$129,500.00
2017	\$135,000.00
Total	\$399,500.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of New South Wales

Project Summary

Coal provides cheap energy for Australia but emits carbon dioxide (CO₂) in large quantities. The solution is to improve the efficiency of coal fired power plants and use CO₂ capture technology. This is feasible by raising steam temperatures and using oxyfuel process where coal is burnt in oxygen rather than in air. Thus the hot combustion gas is very rich in CO₂ plus water vapour, which is however very corrosive at high temperatures. Traditional steels are inadequate. Instead, nickel-base alloys are needed. This project aims to investigate the corrosion behaviour of nickel base alloys in carbon dioxide - water atmospheres, and ways of preventing this corrosion by controlling gas composition and appropriate alloying, which is essential for next generation power plant design.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103071 Zhang, Dr Wenjie; Chen, A/Prof Lei

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation The University of New South Wales

Project Summary

Efficient moving object data processing is highly demanded in many key real applications. This project aims to develop, analyse, implement and evaluate novel techniques to effectively and efficiently monitor moving objects in real time based on a novel query model, loyalty based model. Anticipated outcomes include new indexing, query processing, and approximation techniques, as well as a set of novel theorems. The project is expected to significantly contribute to the technology development of big data regarding streaming and spatial-data processing techniques.

DP150101861 Zhao, Dr Chuan; Hibbert, Em/Prof David B

2015	\$129,000.00
2016	\$133,300.00
2017	\$139,000.00
Total	\$401,300.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of New South Wales

Project Summary

The project aims to develop a new generation of miniature electrochemical devices based on ionic liquids, salts that are liquid at room temperature. In making these devices the project will study the fundamental physicochemical and electrochemical behaviour of the ionic liquid microinterfaces formed, and this will allow optimisation and enhancement of their properties. A gas sensor made of a micro-pattern of ionic liquid drops will be designed to detect gaseous toxic amines, which are released from numerous anthropogenic sources including waste water, sewage treatment, farms and industry. These sensors will be small, specific to the target gas, sensitive, fast in response and portable.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Newcastle

DP150101772 Adkins, Prof Lisa

2015 \$30,469.00

2016 \$64,800.00

2017 \$40,036.00

Total \$135,305.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Newcastle

Project Summary

Underemployment and joblessness have emerged as serious social problems in an age of global economic uncertainty. This project focuses on how, across advanced liberal societies, these problems are being redefined via transnational policy models and experiments seeking to 'activate' underemployed and unemployed populations. This project posits that these experiments articulate a new dynamic between economy and society and aims to provide a better understanding of this dynamic. It aims to deliver a reconceptualisation of under- and unemployment, a new and relevant analysis of policy models, and new empirical insight into the mobilisation of activation policies.

DP150103231 Aitken, Prof Robert J; Nixon, A/Prof Brett

2015 \$133,000.00

2016 \$132,300.00

2017 \$138,000.00

Total \$403,300.00

Primary FoR 0702 ANIMAL PRODUCTION

Administering Organisation The University of Newcastle

Project Summary

This project describes a novel strategy for the non-surgical induction of sterility in male and female mammals with applications in the fields of biotechnology, veterinary medicine and the humane control of pest animal species. The approach is dependent upon the known sensitivity of the germ line to oxidative stress. The strategy rests upon the demonstration that quinone-adducted peptides will selectively bind to non-renewable cell types in the ovary and testis and redox cycle at the cell surface generating a highly localised state of oxidative stress. This stress will then recapitulate the impact of radiation on reproductive tissues by selectively compromising the viability of the germ line, inducing a state of sterility.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100272 Dennis, Prof Simon J; Heathcote, Prof Andrew J; Sloutsky, A/Prof Vladimir

2015	\$148,000.00
2016	\$144,800.00
2017	\$155,000.00
2018	\$155,000.00
2019	\$155,000.00
Total	\$757,800.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of Newcastle

Project Summary

This project aims to develop a model of episodic memory and to apply the model to both adult and child development data. Unlike current approaches, the model is expected to address multiple memory tasks including item recognition, associative recognition, source recognition and cued recall, and also aims to address reaction time data, allowing different sources of interference causing forgetting in adults to be identified. By addressing both encoding and retrieval processes, the model can assess how changes in different sources of interference modulate performance through the trajectory of early development. Hierarchical Bayesian estimation aims to enable a simultaneous account of multiple tasks and support future deployment in applied contexts.

DP150101798 Featherstone, Dr Lisa S; Kaladelfos, Dr Amanda; Strange, Dr Carolyn; Westera, Dr Nina J

2015	\$79,646.00
2016	\$118,200.00
2017	\$39,480.00
Total	\$237,326.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Newcastle

Project Summary

Testimony of sexual abuse before the current Royal Commission has exposed the historic neglect and cover-up of institutional offences. Yet, to unearth the deeper and wider dimensions of sexual offending requires scholarly historical analysis. This project aims to use qualitative and quantitative analysis to track how and why certain forms of sexual behaviour sparked public concern and provoked legal responses and public inquiries from the 1880s to the 1980s. The systematic examination of these patterns through archival and published documents is intended to test the relation between shifting community and political concerns and the conduct of criminal trials.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103521 Fleming, Dr Andrew J

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

This project aims to create new sensing technologies for detecting motion on the atomic scale with Megahertz (MHz) bandwidth. Advanced signal processing and communication theory will be applied with the aim of developing new classes of capacitive, inductive and optical position sensors. The resolution and bandwidth are predicted to be a one-hundred fold improvement over the current state-of-the-art. Applications are expected to include biomedical imaging, high-speed nanofabrication, high-resolution computer numerical control (CNC) machining, high-speed gas and chemical sensors, and ultra-precise seismometers and gyroscopes.

DP150103745 Fu, Prof Minyue; Chen, A/Prof Zhiyong; Vicsek, Prof Tamas; Xie, Prof Lihua

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation The University of Newcastle

Project Summary

A multi-agent system refers to a cooperative group of autonomous agents for achieving certain collective behaviour such as flight formation and micro-robot synchronisation. The project aims to: study network topologies in biological systems and understand their applicability to the control of man-made multi-agent systems; and, develop a new theoretical framework and design methodology for control of heterogeneous multi-agent systems. The expected outcomes include: understanding and application of biologically inspired network topologies for multi-agent systems; new control design methodology for heterogeneous multi-agent systems; and, new applications of multi-agent control in collective robotics and smart electricity grid.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102369 Galvin, Prof Kevin P; Ireland, Dr Peter M

2015	\$160,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$434,300.00

Primary FoR 0914 RESOURCES ENGINEERING AND EXTRACTIVE METALLURGY

Administering Organisation The University of Newcastle

Project Summary

Ion flotation has delivered remarkable separations via high selectivity, recovery and concentration upgrade. Yet, the technology has not provided solutions that are economically viable. This new project, however, aims to deliver the paradigm shift required in the flotation hydrodynamics to finally permit ion flotation to be applied to a broad range of industrial problems. Specifically, the aim is to increase extraction rates by more than an order of magnitude by dramatically increasing bubble-liquid segregation rates, and bubble-surface fluxes. In turn the project is expected to develop a new line of solutions to industrial problems in hydrometallurgy for recovering precious metals and for solving toxic environmental problems.

DP150103886 Goodwin, Prof Graham C; Mirzaeva, Dr Galina

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

The aim of this project is to use variable prediction horizon nonlinear model predictive control to achieve near perfect harmonic suppression for inverters in the face of realistic and unavoidable switching delays. Other aims include further performance improvement based on the application of Kalman observer, and extension of the ideas to a variety of switching topologies and validation of the results by simulation and experiments. The intended main outcome of the project is the development of a methodology for non-interfering operation of inverters, particularly, in grid connected applications. This is expected to facilitate a further integration of renewable energy and highly efficient power utilisation. Both factors are crucial in the sustainable clean energy future.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102153 Hansbro, Prof Phil M; Hertzog, Prof Paul J; Stevens, Prof Richard

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 1102 CARDIORESPIRATORY MEDICINE AND HAEMATOLOGY

Administering Organisation The University of Newcastle

Project Summary

Mast cells (MCs) are immune cells that protect against pathogens but may induce deleterious inflammation. MC function is mediated by specific proteases that are pre-formed and stored in granules. These proteases have unique yet poorly understood mechanisms of regulation. The aim of the project is to use a novel suite of molecular tools and genetically modified mice to identify the critical regions of transcripts that post-transcriptionally regulate the production and storage of these proteins. The project aims to identify the RNA binding proteins, microRNAs and other novel factors that also regulate them. This is expected to elucidate the post-transcriptional mechanisms of regulation of MC proteases.

DP150100845 Harvey, Dr Mark D; Turpin, Dr Myfany M; Proctor, Dr Michael I

2015	\$83,869.00
2016	\$66,600.00
2017	\$51,666.00
Total	\$202,135.00

Primary FoR 2004 LINGUISTICS

Administering Organisation The University of Newcastle

Project Summary

This project addresses a central question about language. How well do we understand the structure of syllables and words? The project aims to examine the Australian language (Kaytetye), the unusual word and syllable structure of which suggests that models of syllable and word structure may require significant revision. The project aims to consider the implications of Kaytetye sound structure for general theories of phonology, and more importantly for ideas about universals in language. The project involves extensive documentation of Kaytetye, which is an endangered language. The project is expected to provide a detailed description of Kaytetye sound structures and articles addressing the implications of these findings for phonological theory.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102088 Holbrook, Prof Allyson P; Scevak, Dr Jill J; Shaw, Dr Kylie M; Bourke, Prof Sidney F; McInerney, Prof Dennis M

2015	\$98,202.00
2016	\$86,200.00
2017	\$58,512.00
2018	\$32,412.00
2019	\$38,210.00
Total	\$313,536.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation The University of Newcastle

Project Summary

Recent evidence concerning metacognitive learning and affect reveals that research degree candidates are a diverse group of learners, and little is known about explaining wasteful attrition, stress and delays in progress. Such a study is essential, especially given the growth in research degrees, new transitional pathways, diversity in candidate backgrounds and chronic high attrition. This longitudinal study applies new findings about doctoral learning profiles in a direct intervention (DOCLearnPro) that targets individual differences across students in doctoral and master's degrees to improve learning outcomes significantly and contribute theoretically, methodologically and substantively in order to advance understanding of researcher development.

DP150100903 Johnson, A/Prof Sarah J; Ong, Dr Lawrence; Lechner, Dr Gottfried

2015	\$115,000.00
2016	\$115,100.00
2017	\$125,000.00
Total	\$355,100.00

Primary FoR 0804 DATA FORMAT

Administering Organisation The University of Newcastle

Project Summary

The aim of this project is to provide new technologies to facilitate the exponential growth in demand for streaming of digital data. Based on novel techniques combining graph theory, information theory, and coding, this project aims to change the way we encode data, offering significant improvements to the efficiency of communication networks and providing a 10-100 fold increase in transmission speed. If successful this project expects to bring digital transmission improvements which could impact on almost every sector of the economy from education to advanced healthcare. Possible applications include cloud storage for big data, high-definition video streaming, and wide-coverage high-speed mobile broadband.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101257 Kisi, Prof Erich H; Fiedler, Dr Thomas

2015	\$120,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$335,500.00

Primary FoR 0913 MECHANICAL ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

This project aims to address the intermittency of renewable energy sources using novel thermal storage media. Advanced heat transfer modelling and in situ neutron diffraction and imaging are intended to be used to optimise the microstructure of newly developed miscibility gap thermal storage systems. The new media store energy as the latent heat of fusion of one phase in a stable, high thermal conductivity inverted microstructure. The high energy density of the latent heat (0.5-4.5 Mega Joules/Litre) requires storage volumes as little as five per cent of those relying upon heat capacity and the metal matrix has a hundred-fold greater thermal conductivity than current systems. It is proposed that a range of such materials will be engineered for concentrated solar thermal and space heating applications.

DP150102508 Kouretzis, Dr Georgios; Sheng, Prof Daichao; Krabbenhoft, A/Prof Kristian

2015	\$170,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$463,900.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

Buried pipeline networks is the most common mode of transporting and distributing water, oil and gas resources and pipeline failures may have a major socioeconomic and environmental impact. The goal is to develop a framework for describing the mechanisms underlying soil-pipe interaction, aiming to reduce the failure risk of pipes affected by geohazards. The project aims to model the response of pipelines in the laboratory, using a new custom-built apparatus. Experimental results are expected to provide insight for developing a theoretical model to quantify the effect of soil moisture on pipe integrity, and propose design formulas. A general framework is intended to be developed for handling various unsaturated soil-structure interaction problems in geotechnical engineering.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100247 Maynard, Prof John; Haskins, A/Prof Victoria K; Bamblett, Dr Lawrence C; Barker, Ms Lorina L; Troy, Dr Jakelin

2015	\$244,598.00
2016	\$227,300.00
2017	\$108,131.00
2018	\$30,000.00
Total	\$610,029.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Newcastle

Project Summary

Between 1883 and 1967 the lives of Aboriginal people in New South Wales (NSW) were in the hands of the NSW Aborigines Protection/Welfare Board. The impact of the Board's systematic control over Aboriginal communities through policies of segregation, assimilation, child removal and wage withholding would endure for decades, and the negative results of those government directives are still being seen today. To date, however, no substantive history of the NSW Aborigines Protection/Welfare Board exists. This project aims to provide such a history, based on extensive archival and oral history research. Holding critical importance to NSW Aboriginal communities, the project expects to encourage the development of Indigenous historians in the process.

DP150100991 McGuirk, Prof Pauline M; Dowling, Prof Robyn

2015	\$49,044.00
2016	\$83,200.00
2017	\$60,244.00
Total	\$192,488.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation The University of Newcastle

Project Summary

Transitioning energy consumption and provision away from fossil fuels toward renewable resources is an urgent priority for Australia. However, the forms of governance required to facilitate these transitions, especially for critically important cities, are not well developed nor well understood. In a novel analysis of the materiality of governance, this project investigates the pathways, practices, and political dynamics of energy transitions in Australia's two largest cities. Through a focus on Central Business Districts and suburban office parks it aims to identify opportunities for, and barriers to, transition. It also aims to shed new light on the limits and potentials of urban energy transitions and to provide an evidence base to inform policy and governance interventions.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101325 Middleton, Prof Richard H

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

This project is concerned with the analysis of networks of interacting dynamic feedback systems. This fundamental area of research underpins transportation networks, biomolecular signalling networks, economic systems, water supply, smart electricity grids, communications and a range of other applications. This work aims to address critical questions relating to robustness and sensitivity analysis questions in this context. This fundamental advance in knowledge is expected to advance Australia's standing as an international authority in the area.

DP150101340 Nazem, Dr Majidreza; Carter, Prof John P

2015	\$140,000.00
2016	\$143,900.00
2017	\$150,000.00
2018	\$150,000.00
Total	\$583,900.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

The main aim of this ambitious project is to address a highly significant and timely class of problems in civil engineering, and in particular in soil mechanics. The outcomes are expected to result in improvements in the design and construction of civil infrastructure. The problems considered are routinely confronted in daily engineering practice whenever a construction site contains weak soil and the ground requires improvement before construction. This project is expected to provide a comprehensive understanding of soil behaviour in this class of problems, leading to robust techniques and advanced computational tools for more cost-effective and safer engineering designs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102210 Paolini, Dr Stefania; Harwood, Prof Jake; Neumann, A/Prof David L; Hewstone, Prof Miles R

2015	\$55,000.00
2016	\$85,400.00
2017	\$78,000.00
2018	\$75,000.00
Total	\$293,400.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Newcastle

Project Summary

Extensive research on group desegregation shows that intergroup contact (face-to-face interactions between people of opposing groups) should be encouraged for harmonious group relations; such contact maximises social integration, self-esteem, health, and productivity. However, these benefits are often missed as people actively avoid intergroup contact. This research introduces a theoretically- and empirically-grounded typology of contact approach-avoidance that aims to: identify personal and situational determinants driving out-group approach in natural settings; delineate outcomes of out-group approach for psychological processes critical to intergroup relations; and, indicate new interventions for encouraging intergroup contact.

DP150101368 Petersen, Dr Eva B

2015	\$107,288.00
2016	\$73,100.00
Total	\$180,388.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation The University of Newcastle

Project Summary

University-based social scientists spend considerable time each year applying for competitive research grants. It is a significant undertaking for universities and individuals. Taking an international comparative approach the project aims to offer original in-depth insight into how so-called 'grantsmanship' is undertaken, how it is learned and how it is experienced. It investigates how different policy and institutional contexts influence such work and how social scientists negotiate scientific and strategic exigencies in the process of proposal writing. Such analysis aims to enhance understanding of the contemporary mechanisms that shape social scientific practice and stimulate professional, political and public debate central to democratic well-being.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100914 Ryan, Prof Lyndall; Nettelbeck, Prof Amanda E; Johnston, A/Prof Anna; Edmonds, A/Prof Penelope C; Haskins, A/Prof Victoria K; Wanalla, Dr Angela

2015	\$99,351.00
2016	\$129,600.00
2017	\$142,230.00
2018	\$128,956.00
Total	\$500,137.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Newcastle

Project Summary

Violence and intimacy were both fundamental to the formation of settler colonial societies, yet we know surprisingly little of how they were connected. Through a large-scale collaboration of leading scholars, this project aims to produce the first transnational analysis of intimacy and violence as key, intertwined vectors in the development of settler societies across the colonial Anglophone Pacific Rim. Drawing out connections between the broad-scale dynamics of colonial rule and the violent and intimate domains of its implementation on the ground, the project aims to generate new comparative insights into the development of colonial settler cultures and create enhanced understanding of their legacies for western settler democracies today.

DP150103396 Sheng, Prof Daichao; Pineda, Dr Jubert A; Gens, Prof Antonio

2015	\$230,000.00
2016	\$172,600.00
2017	\$170,000.00
2018	\$210,000.00
Total	\$782,600.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

Hard soils and soft rocks are transitional materials that have properties evolving from soft rock to soft soil. They are widespread in Australia and typical examples include mudstone, claystones, shales and tuffs. These materials are very difficult to handle, mainly due to the fact that their strength, stiffness and volume can change substantially in response to environmental actions such as cyclic wetting and drying. Proper prediction of the transitional behaviour of these materials is crucially important for analysing the stability and serviceability of civil structures founded on them. This project aims to develop a theoretical and practical framework for characterising the transitional behaviour of hard soils and soft rocks.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104257 Sloan, Prof Scott W; Vignes, Dr Chet

2015	\$160,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$453,900.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Newcastle

Project Summary

The project aims to develop new computational methods and software for simulating hydraulic fracture (commonly known as 'fracking'), which is now being used to extract natural gas from some Australian coal seams. This form of natural gas recovery has the potential to be a major economic driver, but the benefits are currently being tempered by widespread community concern over possible adverse impacts on the environment. The expected outcome is new methods, supported by scientific publications and software, which can be used to guide the natural gas industry and inform regulatory authorities of the risks inherent in hydraulic fracturing.

DP150100060 Willis, Prof George A; Ramagge, Prof Jacqui

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Newcastle

Project Summary

Symmetry is treated mathematically through the algebraic concept of a group. Conversely, geometric representations play a crucial role in group theory. Many classes of groups, such as the connected groups that arise in physics, have useful geometric representations, but such a representation is lacking in the case of general disconnected groups. Certain disconnected groups, closely related in algebraic terms to the connected ones, do have a geometric representation called a 'building'. This project aims to address the lack of a representation for general disconnected groups by extending the notion of a building to create combinatorial structures on which these groups act as symmetries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Sydney

DP150103083 Airey, Prof David W

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$110,000.00
Total	\$435,500.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Sydney

Project Summary

The aims of the project are to provide new data on the conditions under which liquefaction failures can occur in soil materials that are intermediate between sand and clay, and to develop models to describe this behaviour. This project addresses two significant problems: liquefaction failures which occur in silty sediments on continental slopes and produce tsunamis, and liquefaction in unsaturated ship cargos with intermediate gradings which lead to ship losses. The outcomes of the project are expected to be greater understanding of the factors controlling liquefaction in silty materials, a better understanding of the risk of submarine landslides, and models which can be used to predict the conditions under which liquefaction can occur in ship cargos.

DP150103325 Aitchison, Prof Jonathan C; Suzuki, Asst Prof Noritoshi; Noble, Dr Paula J; Danelian, Prof Taniel; Feng, Prof Dr Qinglai

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0403 GEOLOGY

Administering Organisation The University of Sydney

Project Summary

This project will apply a new transformative technology, X-ray micro computed tomography, to the study of Early Palaeozoic (530-300 million year old) radiolarian microfossils. It is expected that this will allow, for the first time, non-destructive examination to elucidate the internal skeletal architecture of these fossils that is critical to understanding their evolution. Computer reconstruction of three-dimensional images will reveal details upon which an understanding of early phylogenetic relationships within this phylum can be developed. This in turn will allow realisation of the full biostratigraphic potential of this important long-ranging group of marine protozoans that commonly occur in great abundance in deep marine sedimentary rocks.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101731 Alais, Prof David M; Burr, Prof David C

2015	\$210,000.00
2016	\$181,800.00
2017	\$200,000.00
2018	\$50,000.00
2019	\$50,000.00
Total	\$691,800.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

The brain encodes sight, sound and touch separately yet our perception is coherent and multisensory. How the brain achieves this is puzzling for it faces a major problem: each sense has a different temporal latency and maps space in different coordinates. Exploiting a new method that revealed a very fast temporal realignment process, this project examines relative timing between touch, vision and hearing and their interaction with motor action to reveal the full scope of sensory and motor recalibration. By determining the spatial coordinates in which recalibration occurs, and examining interactions between on-going temporal modulations once aligned, this project aims to advance knowledge of multisensory integration.

DP150101253 Alexander, Prof Ian E; Charleston, A/Prof Michael

2015	\$172,000.00
2016	\$145,800.00
2017	\$152,000.00
Total	\$469,800.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Sydney

Project Summary

Recently accrued evidence identifies Australia as an ideal closed-model system in which to elucidate the evolutionary history of a group of non-pathogenic viruses, known as adeno-associated viruses (AAVs). This project aims to trace back the evolutionary history of AAVs for tens of millions of years via molecular fossil imprints left behind by ancient viral invasions of Australian marsupial genomes. Concurrently, the potential impact that these viral invasions had on the evolutionary development of their ancestral hosts will be investigated. This could facilitate previously unattainable insights into both AAV and marsupial evolution, with broader implications relevant to the advancement of the fields of virology and mammalian evolution.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102810 Anderson, Prof Warwick H; Johnson, Dr Miranda C

2015	\$77,712.00
2016	\$72,900.00
2017	\$53,355.00
Total	\$203,967.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

How did Aboriginal Australians come to be treated as research subjects in the twentieth century? This project aims to examine six exemplary cases where Aboriginal communities became sites of medical investigation and scientific experiment. It is designed to explore different patterns of sympathy and exploitation, intimacy and objectivity, in the interactions of scientists and Aboriginal people. The sites range from Brewarrina to Hermannsburg, Palm Island and Groote Eylandt; the time period is from the 1910s through the 1990s. The research will endeavour to translate the history of Australian science into a series of Indigenous local histories. Such an approach is unprecedented and is expected to serve as a model for the study of the entanglements between science and Indigenous peoples.

DP150104878 Balleine, Dr Bernard W

2015	\$235,000.00
2016	\$205,800.00
2017	\$225,000.00
2018	\$200,000.00
2019	\$200,000.00
Total	\$1,065,800.00

Primary FoR 1109 NEUROSCIENCES

Administering Organisation The University of Sydney

Project Summary

The smooth integration of cognitive and emotional processes is necessary for everyday decisions. Dysfunction in this integrative capacity accompanies dementia, neurodegenerative conditions and major psychiatric disorders. This project seeks to understand the neural bases of this integration in normal decision-making using cutting edge behavioural, cellular, molecular and genetic tools to map the neural system, circuit and cellular processes controlling the selection, evaluation and choice of goal-directed actions. Such actions can, with continued practice, transition into relatively inflexible habits. Thus, this project aims to investigate the neural processes that mediate this transition and how actions and habits interact in normal decision-making.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103863 Barbour, A/Prof Margaret M; Buckley, Dr Thomas N

2015	\$120,000.00
2016	\$95,900.00
2017	\$98,000.00
Total	\$313,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Sydney

Project Summary

This project aims to measure stomatal conductance to water vapour in the dark in economically important species to understand how conductance is regulated in the dark, and its adaptive significance. Leaves of most plants continue to lose water in the dark because stomata remain open. No photosynthetic carbon fixation can occur in the dark so water-use efficiency is reduced, and this reduction influences crop yield, forest growth, catchment water yield and climate feedback. Existing mechanistic models of stomatal conductance will be extended to include responses in the dark, and aim to be used to predict the reduction in potential daytime water loss (which is coupled to carbon gain) due to nocturnal stomatal conductance for crops and forests.

DP150101718 Barrett, Prof Garry F; Atalay, Dr Kadir; Edwards, Dr Rebecca; Fisher, Dr Hayley; Blundell, Prof Sir Richard W; Low, Prof Hamish

2015	\$79,918.00
2016	\$73,900.00
2017	\$82,349.00
Total	\$236,167.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Sydney

Project Summary

Australian social and economic policy requires a sophisticated understanding of the interaction of public policy with recent demographic trends, including the growth in fragile families and the ageing population. This project aims to develop innovative dynamic models of family decision-making to produce new estimates of the impact of significant Australian public policy reforms on labour supply, fertility, family formation, and retirement decisions. Structural econometric models will be used to simulate the effects of variation in the design of the Parenting Payment Single, Age Pension and other programs. The project findings are expected to generate economic and social policy recommendations.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100121 Betts, Prof Alison V; Vicziany, Prof Marika A; Di Castro, Dr Angelo Andrea; Dodson, Prof John R; Cong, A/Prof Dexin; Li, Prof Xiao Qiang; Salzman, Prof Philip C

2015	\$211,715.00
2016	\$186,300.00
2017	\$209,202.00
2018	\$66,665.00
Total	\$673,882.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The University of Sydney

Project Summary

The early rise of China's great civilization owed its rapid momentum to important technological innovations that were brought in from the far distant Eurasian steppes, but almost nothing is known of how or why this process took place. The project aims to explore these questions through excavations at one of China's most important Bronze Age archaeological sites in western Xinjiang. The innovations include the cultivation of wheat and barley, complex metallurgical techniques in bronze, silver and gold, the domesticated horse and the spoke-wheeled chariot, which became a universal weapon of war across the ancient world. The project aims to test theories of cultural transmission through interactive GIS modelling of environment and land use potential.

DP150104667 Bland-Hawthorn, Prof Jonathan; Bedding, Prof Timothy R

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Sydney

Project Summary

The vast stellar content of our Galaxy contains the fossil imprints of how it was formed. The current model for galaxy formation, the Cold Dark Matter (CDM) paradigm, is that they have built up over billions of years by the merging of smaller systems, but cosmological simulations fail to reproduce the key properties of individual galaxies. The predicted high level of merger activity makes it very difficult to form galaxies like our own. This is the key stumbling block to progress at the present time. The project aims to assess observationally how important mergers have been in the formation of the Galaxy, the critical test of CDM. The project will target the stars in the Galactic disk and bulge with the HERMES wide-field spectrograph.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103299 Bliemer, Prof Dr Michiel; Waller, Prof Steven T; Hensher, Prof David A; Dixit, Dr Vinayak V; Rutstrom, Prof Elisabet E; Hess, Prof Dr Stephane; Van Lint, Prof Dr Hans

2015	\$125,000.00
2016	\$204,800.00
2017	\$225,000.00
2018	\$123,000.00
Total	\$677,800.00

Primary FoR 1507 TRANSPORTATION AND FREIGHT SERVICES

Administering Organisation The University of Sydney

Project Summary

Since large monetary investments are involved in infrastructure decisions, it is of utmost importance that impacts of transport policies can be accurately predicted. The recent failures to forecast usage and revenues of toll tunnels in Australia illustrate this well. This project aims to contribute by producing improved practical behavioural models to predict responses to such transport policies to assist in better decision making. Further, the project is expected to make several methodological contributions by for the first time merging methods from stated choice surveys, experimental economics, and naturalistic driving simulators in order to better investigate travel choice behaviour in realistic environments.

DP150104077 Borghesi, Dr Francesco

2015	\$60,000.00
2016	\$53,700.00
2017	\$66,000.00
Total	\$179,700.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

This project aims to analyse the diffusion and the political and religious use of the concept of concord among humanists, philosophers, theologians, poets and political writers during the fourteenth and the fifteenth century in the Italian peninsula. Starting with a novel approach to the thought of the humanist Giovanni Pico della Mirandola, this analysis is expected to result in an enriched view of the Italian Renaissance, which will be re-assessed based on its contribution to the idea of common good. This project also aims to evaluate the uses and meanings of concord in relation to those of tolerance to show how, on the basis of a historically informed and theoretically sound definition, concord can become a new concept for modern political theory.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102771 Byrne, Prof Maria; Dworjanyn, Dr Symon A; Poore, A/Prof Alistair G

2015	\$153,000.00
2016	\$138,100.00
2017	\$152,000.00
2018	\$145,000.00
2019	\$137,000.00
Total	\$725,100.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Sydney

Project Summary

As the oceans simultaneously warm and acidify, prospects for marine biota are of concern. This project aims to determine the potential for phenotypic adjustment and evolutionary adaptation. To discern the roles of phenotype and genotype in marine invertebrate stress tolerance this project endeavours to use selection experiments, long-term rearing and quantitative genetics . A focus on vulnerable calcification systems could determine genetic mechanisms underlying impaired growth. Investigation of species from the east Australia latitudinal thermal gradient, a global change hot spot could generate insights into biological responses and adaptive potential in a changing ocean and on time scales relevant to resource managers to understand the challenges faced by marine biota.

DP150103953 Chan, Prof Hak-Kim; Finlay, Prof Warren; Carter, Dr Elizabeth A; Vehring, A/Prof Reinhard

2015	\$177,192.00
2016	\$183,600.00
2017	\$185,730.00
Total	\$546,522.00

Primary FoR 1115 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

This project aims to explore the use of bacteriophages towards producing a safe, natural, and highly effective alternative to traditional antibiotics. Respiratory infections caused by multidrug-resistant Gram-negative bacteria are a major health problem worldwide, and cost Australia over \$150 million annually. Some 5,000 Australians die each year from antibiotic resistant infections. The project aims to produce efficacious and stable formulations of bacteriophages for easy delivery by inhalation as aerosols with a long shelf-life, making them a commercially viable product. The expected research outcome can lead to an economic and efficient technology to produce phage powders for novel treatment strategies of infections by inhalation.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101112 Clarke, A/Prof Ronald J; Cornelius, Prof Flemming

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Sydney

Project Summary

The sodium pump is the major energy-consuming enzyme of animal cells. Its ion pumping is essential to numerous physiological processes (e.g. nerve, muscle and kidney activity and the maintenance of cell volume). Because of its importance in so many cell functions, the enzyme must be able to respond to cellular conditions. Using measurements of the enzyme's activity in isolated membrane fragments and comparison with its behaviour in living cells, this project aims to determine how sodium pump activity is modulated by transmembrane electric potential and intramembrane electric field strength. Our project could provide fundamental new knowledge on how membrane protein function in general can be controlled by electrical properties of their lipid surroundings.

DP150103518 Clarke, Dr Anne F; Philp, Dr Jude P; Torrence, Dr Robin -; Knowles, Ms Chantal M

2015	\$146,283.00
2016	\$189,500.00
2017	\$143,243.00
Total	\$479,026.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The University of Sydney

Project Summary

Sensing the impacts of colonisation, the first Administrator of British New Guinea William MacGregor made a significant collection of objects specifically for its future citizens. This comprehensive legacy of 13 000 objects did not remain in the country but was dispersed to three Australian and six overseas museums. Our aim is to re-assemble and re-connect this material by 'excavating' its private and official components. This research aims to focus on the makers and traders to disentangle the social relationships embedded in the objects. Using material-centred, assemblage-based archaeological approaches, we aim to investigate how indigenous groups used objects to negotiate with the new colonial government.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100424 Clarke, Dr Frances M; Plant, A/Prof Rebecca J

2015	\$40,302.00
2016	\$30,000.00
2017	\$30,000.00
Total	\$100,302.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Sydney

Project Summary

Today, the term 'child soldier' evokes images of youths brutally coerced into fighting wars in the developing world. Yet until recently, children aged seven to seventeen made up a significant portion of the American military. Masses of children also joined organisations or schools structured along military lines. This project is expected to provide the first examination of the relationship between childhood and militarism across United States history. Exploring debates over the militarisation of childhood, as well as the experiences of child soldiers themselves, it aims to reveal how changing understandings of childhood intersected with evolving attitudes toward America as a military nation.

DP150104026 Colagiuri, Dr Ben; Sharpe, Prof Ann Louise

2015	\$90,000.00
2016	\$96,900.00
2017	\$108,000.00
Total	\$294,900.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

Double-blind randomised placebo-controlled trials (RCTs) are considered the gold standard for establishing treatment efficacy. However, there are both theoretical and empirical reasons to believe that they do not adequately control for the placebo effect. Cost and ethical considerations prevent researchers conducting actual double-blind RCTs with patients from exploring these issues. To address this gap, this project uses novel experimental models to systematically test key aspects of the double-blind RCT methodology that are intended to control for the placebo effect. The project aims to provide essential data on the validity of these trials, thereby improving Australia's health and ensuring that Government treatment subsidies are well spent.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104066 Cooper, Dr Spring C; Albury, Dr Katherine M; Chung, Dr Kon Shing Kenneth; Skinner, A/Prof Susan R; Lim, Dr Megan S

2015	\$100,000.00
2016	\$95,900.00
2017	\$112,000.00
Total	\$307,900.00

Primary FoR 2001 COMMUNICATION AND MEDIA STUDIES

Administering Organisation The University of Sydney

Project Summary

This project will explore whether there exists a relationship between adolescents' social networks (both online and offline) and one important aspect of healthy sexual development - the development of sexual agency - and if so, it will investigate the nature of that relationship. The longitudinal mixed methods study proposed here aims to capture the development of sexual behaviours and the online and offline interactions adolescents engage in. This project aims to determine: whether there is a relationship between adolescents' online and offline social networks and the development of sexual agency; if such a relationship exists, what is its nature? And, if the relationship exists, to what extent is the relationship moderated by online social media use?

DP150100570 D'Alessandro, Dr Deanna M; Abrahams, A/Prof Brendan F; Robson, Prof Richard

2015	\$170,000.00
2016	\$163,000.00
2017	\$150,000.00
Total	\$483,000.00

Primary FoR 0303 MACROMOLECULAR AND MATERIALS CHEMISTRY

Administering Organisation The University of Sydney

Project Summary

The development of multifunctional coordination solids represents one of the foremost challenges in the field of advanced materials as their properties underpin the next generation of technologically useful devices. Using a highly targeted theoretical and experimental approach for crystal engineering, this project aims to generate coordination solids that integrate radicals as molecular components for charge transfer. At a fundamental level these materials will offer unprecedented insights into charge delocalisation and radical-induced switching phenomena in three-dimensional coordination space. It is expected that the outcomes of the project will spur the development of devices for applications ranging from solid state sensing to energy conversion and storage.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101226 Driscoll, A/Prof Catherine A; Cather, A/Prof Kirsten; Evans, Miss Jennifer; Gomes, A/Prof Mayra R; Mehta, A/Prof Monika; Qiu, A/Prof Zitong; Tomiczek, Dr Caroline M

2015	\$105,890.00
2016	\$146,500.00
2017	\$115,592.00
Total	\$367,982.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation The University of Sydney

Project Summary

The central question for media classification is 'by whom should this be consumed?' This project aims to examine the ways in which this question has been answered across the twentieth and twenty-first centuries. Encompassing case studies of India, Japan, the United States of America, United Kingdom, Brazil and China, and with a particular emphasis on Australia, the project is intended to produce a comparative history of the emergence of media classification systems based on the international exchange of policy approaches, ideas about public interest and the protection of minors and the circulation of media objects. This research aims to address the continuing significance of the media classification question in an era of media convergence.

DP150104163 Ellis, A/Prof Robert A; Goodyear, Prof Peter M; Fisher, A/Prof Kenneth D; Marmot, Prof Alexi

2015	\$95,000.00
2016	\$105,500.00
2017	\$120,000.00
2018	\$100,000.00
2019	\$100,000.00
Total	\$520,500.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation The University of Sydney

Project Summary

The growing use of digital tools and resources means that students' learning activities are no longer tied to unique physical places. Their work is distributed across increasingly complex mixtures of physical and digital spaces, which both shape and are shaped by students' activity. This project aims to identify productive ways of modelling the characteristics and uses of complex learning spaces in higher education. Evidence and models generated by the project aim to strengthen the logic connecting the use, management and design of learning spaces. A better understanding of the relations between pedagogy, activity and space will improve the work of architects and other designers, campus managers, university teachers and students themselves.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102398 Frank, Dr Richard W

2015	\$64,000.00
2016	\$53,700.00
Total	\$117,700.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The University of Sydney

Project Summary

Roughly a quarter of national elections around the world are accompanied by the use of deadly violence. While the frequency of violence has remained almost constant for decades, researchers are only beginning to explore comparatively the myriad causes of election violence and what can be done to prevent it. Therefore, the proposed research focuses on answering two fundamental yet unanswered questions: why do various types of election violence occur, and what interventions are most effective at preventing them? The research design centres on analysing data on specific election violence events (perpetrators, victims, and method) and data on election interventions to test hypotheses on underlying causes and effective interventions.

DP150104007 Franks, A/Prof Peter J; Berry, Prof Joseph; Bergmann, A/Prof Dominique; Bonan, Dr Gordon

2015	\$155,000.00
2016	\$124,700.00
2017	\$125,000.00
Total	\$404,700.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation The University of Sydney

Project Summary

Earth's atmospheric carbon dioxide (CO₂) sustains all terrestrial vegetation, yet the effects of increasing concentrations of this gas on plant productivity are difficult to predict. The project aims to undertake experiments on the leaf-level processes that underpin plant productivity in multiple global vegetation systems. This could enable the development of a new theoretical approach to predicting plant productivity in changed environmental circumstances at all scales. The results of this project could provide new tools for understanding the vulnerabilities and sensitivities of natural and managed landscapes under environmental pressures associated with increasing CO₂.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103671 Gal, A/Prof Ofer

2015	\$55,000.00
2016	\$43,200.00
2017	\$58,000.00
Total	\$156,200.00

Primary FoR 2202 HISTORY AND PHILOSOPHY OF SPECIFIC FIELDS

Administering Organisation The University of Sydney

Project Summary

Modern science and the modern state came to the world together. They emerged from the Scientific Revolution of the 17th century, which changed not only the way people understood the world, but how they understood themselves as individuals and communities. By analysing scientific, philosophical and political documents, some canonical and some rarely read, this project aims to reveal the ethical and political implications of the rise of modern science. It is expected to be the first comprehensive study of the co-formation of science and the state in their era of origin, shedding crucial and surprising light on the place of science in culture and politics ever since.

DP150101848 Giles, Prof Paul D

2015	\$33,047.00
2016	\$32,600.00
2017	\$35,222.00
Total	\$100,869.00

Primary FoR 2005 LITERARY STUDIES

Administering Organisation The University of Sydney

Project Summary

The aim of this project is to produce a comparative cultural history of time, with particular emphasis on how temporality has been represented in literary works from the Middle Ages to the present day. Tracking the genealogy of temporality is expected to raise important questions about relationships between literature and history, and about ways in which cultural artifacts of various kinds interact with the environment that produces them. The project also aims to explore how Australian conceptions of temporality serve to highlight aspects of the sequence of time that have been implicit, though largely suppressed, in other cultures. The major output planned is a significant monograph on this topic.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101966 Gill, Prof Graeme J

2015	\$56,000.00
2016	\$45,100.00
2017	\$30,000.00
Total	\$131,100.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The University of Sydney

Project Summary

This project will analyse the dynamics of elite politics in authoritarian polities, focusing in particular upon how members of the elite try to constrain would-be dictators. By showing the different patterns of elite politics in different types of authoritarian systems, the project will interrogate one of the most curious aspects of contemporary international politics, why so many authoritarian regimes have been able to stabilise themselves in an era commonly seen as being one of democratic advance. Understanding authoritarian elite politics and their implications for regime survival is of significant policy interest.

DP150104267 Goldwater, Dr Micah B; Jacobson, Prof Michael J; Livesey, Dr Evan J

2015	\$120,000.00
2016	\$115,100.00
2017	\$130,000.00
Total	\$365,100.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of Sydney

Project Summary

A central goal of education is for students to transfer what they learn to new contexts or problems. Indeed, expert reasoning is often characterised by seeing the deep structural commonalities across seemingly disparate situations. However, the knowledge students acquire is notoriously inert, tied to the specifics of the learning examples. This project aims to move towards solving 'the inert knowledge problem' by investigating how humans learn concepts defined by abstract relational structure, and by designing educational applications that enhance the use of relational learning mechanisms in students with a wide range of cognitive abilities.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104472 Graeber, Prof Manuel B; Becker, Prof Thomas S

2015	\$58,706.00
2016	\$60,500.00
2017	\$59,606.00
Total	\$178,812.00

Primary FoR 1109 NEUROSCIENCES

Administering Organisation The University of Sydney

Project Summary

Microglia are the immune cells of the brain and are known to respond to infectious and non-infectious insults to the nervous system. This project aims to use the transparent and genetically amenable brain of the zebrafish, to explore new functions of microglia at the single cell level in the intact, behaving animal, through visualization of cellular components of the brain (neurons, glia, microglia, blood vessels, synapses), and through the genetic manipulation of synaptic density, and real time observation of microglia in the process.

DP150102875 Griffiths, Prof Paul E; Rainey, Prof Paul B; Godfrey-Smith, Prof Peter R

2015	\$96,000.00
2016	\$76,700.00
Total	\$172,700.00

Primary FoR 2202 HISTORY AND PHILOSOPHY OF SPECIFIC FIELDS

Administering Organisation The University of Sydney

Project Summary

The principle of natural selection is standardly applied to distinct competing organisms, each of which is descended from one or more others. But these matters were not clear in the early evolution of life, or during the evolution of new levels of organisation, like multi-cellular organisms. They are also unclear when we look at the evolution of multi-species communities such as the human gut microbiome. There is a substantial philosophical literature on this problem, which sketches how ideas such as selection and heredity can be relaxed to apply more widely. This project seeks to develop these conceptual proposals, with the help of simple mathematical models, to the point where biologists could potentially test them experimentally.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101134 Gudmundsson, A/Prof Joachim; Fellows, Prof Michael R; Gaspers, Dr Serge; Mestre, Dr Julian; Fomin, Prof Fedor

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0802 COMPUTATION THEORY AND MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

Theoretical computer science has up until now had little impact on the design of effective heuristics. While data sets may be large, significant structure is almost always present and important to take into account when designing algorithms. Parameterised complexity considers the underlying structure by parameterising not only on the size of the input but also on structural parameters. This project aims to take advantage of the many opportunities for new theories in the design of new heuristics and in turbocharging existing heuristics for computationally hard problems.

DP150101274 Harris, Prof Justin A

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$50,000.00
2019	\$50,000.00
Total	\$425,500.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

The project studies how animals learn about statistical relationships between events (for example, between a visual cue and food). Such learning is highly adaptive, but can contribute to maladaptive behaviours like phobias, addictions, and over-eating. A detailed understanding of learning mechanisms is crucial if we are to develop interventions to control these behaviours. In keeping with that goal, this project focuses on learning about negative correlations, as when a cue signals that food will not occur (inhibitory learning) and when a cue that once signalled food now does not (extinction learning). It uses recently developed tools for uncovering the content of learning, and combines experimental and computational analysis of learning algorithms.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102144 Jacobson, Prof Michael J; Richards, Prof Deborah C; Taylor, A/Prof Charlotte E; Sutherland, Dr Louise M; Kapur, Dr Manu

2015	\$245,000.00
2016	\$201,000.00
2017	\$220,000.00
Total	\$666,000.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation The University of Sydney

Project Summary

It is vital that students understand science given its relevance in important economic and professional areas as well as for an informed democratic citizenry. This project aims to conduct classroom-based research in which students learn content in the Australian Curriculum - Science through the use of an innovative agent-based virtual learning environment that supports authentic science inquiry activities to enhance learning of difficult scientific knowledge and skills. The project also aims to develop teacher professional development materials for teachers to enhance teacher capacity to use innovative pedagogies and learning technologies in Australian schools.

DP150102863 Kennedy, Prof Brendan J; Ling, A/Prof Chris D

2015	\$160,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$130,000.00
Total	\$544,700.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Sydney

Project Summary

This project seeks to understand how defects and local disorder can facilitate solid-state ionic conductivity in complex oxides. Particular attention will be paid to the under-explored mechanisms by which excess oxygen can be incorporated in these oxides, as opposed to the conventional scenario in which conduction occurs through vacant sites due to an oxygen deficiency. The project aims to characterise the target oxides at various length scales using advanced diffraction, spectroscopy and imaging methods, to obtain a holistic multi-scale picture of their structures. It is expected that this will reveal the structure-property relationships required to rationally design new and improved oxide-ion conductors for applications such as solid oxide fuel cells.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104620 Kepert, Prof Cameron J

2015	\$124,000.00
2016	\$118,900.00
2017	\$124,000.00
Total	\$366,900.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Sydney

Project Summary

This project targets the strategic incorporation of three important high-order functionalities into metal-organic framework materials. These are nanoporosity, that is the reversible inclusion of molecules and ions; anomalous mechanical response to changes in temperature, pressure and included guests; and electronic/magnetic function, specifically electron transfer and magnetic alignment. Examination of the unique interplay between these properties will address key questions in the science of nanoscale systems and may lead to the discovery of exciting new emergent phenomena. This will underpin the development of advanced new technologies, spanning gas separations, rechargeable batteries, high precision componetry and molecular electronic devices.

DP150100912 Kirkpatrick, A/Prof Michael P; Williamson, Dr Nicholas J; Lin, A/Prof Wenxian; Armfield, Prof Steven W

2015	\$120,000.00
2016	\$115,100.00
2017	\$100,000.00
Total	\$335,100.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Sydney

Project Summary

Thermal stratification is common in Australia's rivers due to our hot, drought-prone climate and high human demands relative to available supply, which has led to a significant reduction in flows relative to natural levels. Thermal stratification inhibits mixing, creating stagnant conditions characterised by low oxygen levels and increased concentrations of contaminants, leading to algal blooms, fish kills and systemic damage to ecosystems. The aim of this project is to develop predictive models for the effects of physical processes such as night-time cooling, wind, turbulence and currents on riverine thermal stratification. This is expected to enable a more accurate determination of the flow rates required to maintain the health of our river systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104507 Lehrer, Prof Gustav I; Zhang, Prof Ruibin

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$130,000.00
2019	\$130,000.00
Total	\$644,700.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

Symmetry is a basic organising tool for humans to understand their environment. Invariants are the mathematical embodiment of symmetry, and their study is as ancient as thought itself. This project aims to use the tools of braided tensor categories and cellular structure, to analyse the invariants occurring in several fundamental areas of mathematics, particularly relating to physics. The endomorphism algebras in certain tensor categories, particularly those for quantised superalgebras, will be realised as diagram algebras, and analysed using cellular theory. The intended output include criteria for semisimplicity, a new theory of diagram algebras, and decomposition theory which are expected to permit the determination of multiplicities of composition factors.

DP150101121 Liao, Prof Xiaozhou; Sheng, A/Prof Howard; An, Dr Xianghai; Song, Prof Min

2015	\$115,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$350,100.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Sydney

Project Summary

Amorphous alloys are the strongest metallic materials. However, the brittle nature of the materials has significantly limited their applicability in reliability-critical structural applications. Despite significant worldwide efforts, improvement of the ductility has been limited to amorphous alloys with only a few specific compositions. This project aims to develop a universal approach to substantially enhancing the ductility of amorphous alloys through the application of severe plastic deformation, to explore the effect of severe plastic deformation on structure, and to reveal the fundamental mechanisms of the mechanical behaviour of amorphous alloys. The results are expected to enable structural design of amorphous alloys with excellent ductility.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103717 Llewellyn, Prof Gwynnyth M; Vaughan, Dr Cathy; Emerson, Prof Eric

2015 \$72,637.00

2016 \$119,700.00

2017 \$74,507.00

Total \$266,844.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The University of Sydney

Project Summary

Young Australians with disabilities face pervasive disadvantages and institutional discrimination in many areas of life excluding them from social and economic participation. This project builds on this knowledge to investigate the inter-personal discrimination young people with disabilities experience in public and the impact of this discrimination on their social, economic, cultural and emotional lives. The potential outcome of this project will be a better understanding of the range and impact of actions and behaviours that young people with disabilities experience as discriminatory, violent or unsafe in public in Australia today.

DP150101158 MacCann, Dr Carolyn E; Minbashian, Dr Amirali; Roberts, Dr Richard D

2015 \$100,000.00

2016 \$115,100.00

2017 \$120,000.00

Total \$335,100.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Sydney

Project Summary

Little is known about the underlying processes of emotional intelligence, as existing research uses descriptive structural models rather than explanatory process models. This project aims to produce a within-person process model of emotion management, the cornerstone skill of emotional intelligence. The project aims to: test the model with experience sampling; test the causal direction of the model with experimental manipulations; and, develop a training program to test whether the causal processes can be manipulated. This process model is expected to represent a major theoretical breakthrough for emotional intelligence research and to pave the way for evidence-based training programs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104160 Mai, Prof Yiu-Wing; Chang, Dr Li; Williams, Prof Gordon J

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Sydney

Project Summary

Cutting of soft materials is a common daily life experience (e.g. slicing of meat and cheese) and an essential operation in many industries, healthcare (e.g. surgery) and manufacturing (e.g. paint removal) among them. By measuring the cutting forces of the tool and examining the deformation mechanisms of the work-piece, this project aims to put the cutting process on a strong scientific and technological footing. It provides an ingenious method to measure the fracture energy, i.e. specific resistance to cracking, of plastics, bulk and thin film polymer nanocomposites at different cut-depths. New knowledge gained from the project is expected to improve tool design and optimise cutting conditions to increase the cutting process efficiency.

DP150100577 Manchester, Dr Ian R; Slotine, Prof Jean-Jacques E

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
2018	\$105,000.00
2019	\$105,000.00
Total	\$520,700.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

The coming generation of robots are highly mobile and will interact significantly with their environment, each other, and human collaborators. However, this leads to highly coupled nonlinear dynamical behaviour, and achieving accurate and reliable control of these systems is pushing current control theory to breaking point. This project aims to develop a new approach to control of nonlinear systems based on contraction theory and convex optimisation, extending the power of optimisation-based control from linear to non-linear systems. The project is expected to lead to new theoretical developments, constructive algorithms and software, and experimental demonstrations on a range of platforms including bipedal walking robots and underwater robots.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102515 Maschmeyer, Prof Dr Thomas; Masters, A/Prof Anthony F

2015	\$194,000.00
2016	\$180,300.00
2017	\$181,000.00
Total	\$555,300.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Sydney

Project Summary

If the prospective 'hydrogen economy' is to use hydrogen as a fuel and energy carrier to replace fossil sources, vast amounts of renewable cheap hydrogen must be available. A likely candidate is catalytic water splitting by sunlight. The hydrogen can be made affordable, by coupling hydrogen production to a higher value-added stream. The aim of this project is to produce a stable, hybrid heterogenous catalyst system able to oxidise organic substrates derived from lignin biomass as an adjunct to visible light hydrogen generation from water. The significance will be to provide fuels and organic chemicals for industry from biomass, water and sunlight and catalytically remediate waste water with sunlight.

DP150103431 Mathas, Prof Andrew

2015	\$135,000.00
2016	\$129,500.00
2017	\$135,000.00
Total	\$399,500.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Sydney

Project Summary

This project aims to give important new information about the graded Specht modules and the irreducible graded modules of the cyclotomic Hecke algebras. Experts have long considered that computing the dimensions of the irreducible representations to be completely intractable, however, the powerful new tools provided by the recently discovered KLR-grading gives rise to the combinatorics for solving this problem and for describing the graded decomposition numbers of these algebras. Even in characteristic zero this is incredibly interesting because, as a special case, it would give explicit combinatorial formulas for parabolic Kazhdan-Lusztig polynomials, a problem that has been studied intensely (without solution) for over thirty years.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100789 Molev, Prof Alexander I

2015	\$115,000.00
2016	\$114,100.00
2017	\$124,000.00
Total	\$353,100.00

Primary FoR 0105 MATHEMATICAL PHYSICS

Administering Organisation The University of Sydney

Project Summary

The project aims to address major mathematical problems on representations of the families of quantum groups and vertex algebras associated with Lie algebras. It aims to create new connections between representation theory and mathematical physics. The theory of quantum groups originated from solvable lattice models in statistical mechanics and has turned out to have important connections with and applications to a wide range of subjects in mathematics and physics. The project aims to rely on these connections to extend and develop explicit theory of both the classical and quantum versions of the vertex algebras which are of great importance to conformal field theory and soliton spin chain models.

DP150103369 New, Dr Elizabeth J; Hambley, Prof Trevor W

2015	\$110,000.00
2016	\$105,500.00
2017	\$105,000.00
Total	\$320,500.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Sydney

Project Summary

The copper transport protein CTR1 is commonly believed to transport active cisplatin (a platinum-based anticancer agent) into the cell, but this model is inconsistent with the chemical properties of platinum (Pt) and CTR1. The project aims to interrogate the interaction between CTR1 and Pt in cells by developing new chemical tools for the study of Pt species within cells. It will then study the effect of the CTR1-Pt interaction on copper homeostasis and cell phenotype. It is expected that the results will provide valuable information on the status of CTR1 and Pt following interaction, and reveal whether less toxic complexes are just as effective in decreasing cell malignancy as cisplatin itself.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100151 Oldroyd, Prof Benjamin P; Ashe, Dr Alyson

2015	\$152,000.00
2016	\$140,000.00
2017	\$132,000.00
Total	\$424,000.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Sydney

Project Summary

This project aims to uncover the mechanisms behind epigenetic inheritance in bees, providing deep insights into their biology, and develop an outstanding new system for studying epigenetics. There are compelling theoretical and empirical reasons to predict epigenetic inheritance in honey bees. Further, reciprocal crosses reveal strong paternal effects suggesting that males modify their sperm to increase the reproductive success of their female offspring. Modification of DNA by methylation and the transfer of small RNA molecules in eggs or semen are two candidate mechanisms by which queens and drones may manipulate gene expression in their offspring.

DP150101985 Oldroyd, Prof Benjamin P; Gloag, Dr Rosalyn S

2015	\$120,000.00
2016	\$124,700.00
2017	\$120,000.00
Total	\$364,700.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Sydney

Project Summary

This project aims to determine whether thelytokous parthenogenesis (the ability of queens and workers to clone themselves) is a critical factor in the successful establishment of invasive social insects in Australia and elsewhere. When an exotic social insect species arrives in Australia the population will usually expire due to a lack of conspecifics for mating, and severe inbreeding. Nonetheless, a few ant, bee and wasp species have managed to establish here and are among our worst invasive animals. The project plans to show how the Asian hive bee became established in Queensland and to assess the risks it poses to industry and the environment. This research should help the nation to respond more effectively to the next social insect invader.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101353 Onslow, Prof Mark; Packman, A/Prof Ann; Lagopoulos, A/Prof Jim; Lowe, Dr Robyn

2015 \$80,000.00

2016 \$76,700.00

2017 \$80,000.00

Total \$236,700.00

Primary FoR 1103 CLINICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

The aim of the project is to determine whether the brain abnormalities that have been found in people who stutter are present at birth. The hypothesis is that the brains of neonates who subsequently start to stutter will differ significantly from those who do not. This is the first project to investigate the brains of infants before they start to stutter.

DP150100779 Palomba, Dr Stefano; de Sterke, Prof Carel M; Novotny, Prof Dr Lukas; Zhang, Prof Xiang

2015 \$190,000.00

2016 \$137,100.00

2017 \$155,000.00

Total \$482,100.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The University of Sydney

Project Summary

Fast processing of information is central to modern society. This task is traditionally carried out by electronics, which however is becoming too slow and energy-consuming for some tasks. Among alternative technologies optics is the most promising, because it is fast and potentially energy efficient, but possible optical solutions are either quite bulky or suffer from high ohmic losses because the light needs to travel through metal. This project aims to design and fabricate a device which emits a train of short pulses, a key requirement for any signal processing, and in which the light resides mostly in low-loss material. By using metals merely to confine the light, such a 'hybrid' device would avoid the drawbacks of traditional photonic solutions.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102053 Pritchard, A/Prof William N; Rammohan, A/Prof Anu; Dibley, A/Prof Michael J

2015	\$180,000.00
2016	\$248,900.00
2017	\$240,000.00
Total	\$668,900.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation The University of Sydney

Project Summary

Global progress against malnutrition has been too slow to allow the Millennium Development Goals on hunger to be met. International research has proposed that these failures are due to the fact that the livelihood options available to poor households are increasingly misaligned from their traditional channels for ensuring food and nutrition security. This argument is highly influential in international development research, underpinning calls for nutrition-sensitive development interventions. The aim of this project is to test the proposition using original survey data collected from 1 600 households in rural Myanmar. This will be the first project of this kind, aiming to shed crucial insight into this issue at this vital moment in Myanmar's transition.

DP150104873 Rasmussen, Prof Kim J; Zhang, Dr Hao; Silva, Prof Luis d

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Sydney

Project Summary

The project has two main components, namely to establish a mechanics-based nonlinear model for representing joints in structural analyses, and a reliability framework at system level that considers randomness in the strength and behaviour of both members and joints. As its main aim, the project aims to pave the way for introducing computer-based direct design of steel frames in the structural engineering community, thus obviating the need for checking member and joint strengths to a structural standard. The direct design approach is more accurate, economical and faster than current design practice, provides more uniform structural system reliability, and encourages innovation in structural and architectural forms.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103365 Reilly, Dr James M

2015	\$58,000.00
2016	\$64,300.00
2017	\$43,000.00
Total	\$165,300.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The University of Sydney

Project Summary

Chinese leaders increasingly deploy economic resources such as foreign aid and overseas investments to influence policy decisions in other countries. To implement economic statecraft, China's leaders rely upon their state-owned companies, bureaucratic agencies, and local officials, even though they are often unreliable representatives of the central government. Applying an innovative economic theory, this project examines how central leaders' delegation of authority shapes the effectiveness of China's economic statecraft across mainland Asia. The results aim to specify the conditions under which China is able to translate wealth into power—to utilize economic resources to exert political influence abroad.

DP150101307 Slonim, Prof Robert L

2015	\$151,000.00
2016	\$197,100.00
2017	\$210,000.00
2018	\$186,000.00
2019	\$120,000.00
Total	\$864,100.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Sydney

Project Summary

Plasma and bone marrow save and improve the quality of many lives. Yet Australia's domestic volunteer supply fails to meet Australia's needs even when supplemented by costly imports. This project involves a series of field experiments, based on behavioural economic theories, designed to understand charitable behaviour and how to motivate and increase plasma and bone marrow supply. The project aims to test the value of motivational factors, including commitment devices, reciprocity and altruism, to increasing donations. The project aims to advance scientific knowledge of people's motivation to perform substantial altruistic actions (in terms of both time and pain), to provide effective methods to increase donations that save lives and to improve national health.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101406 Smith, Dr Lorraine D; Willis, A/Prof Karen F; Lewis, Dr Sophie; Wyke, Prof Sally; Rogers, Prof Anne

2015	\$103,747.00
2016	\$110,200.00
2017	\$111,930.00
Total	\$325,877.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The University of Sydney

Project Summary

Chronic condition healthcare contributes 70 per cent of Australia's healthcare burden. Without a cure, chronic condition self-management is imperative. The dominant medical approach prioritises compliance with medical and lifestyle regimes. There is little evidence that patients' needs and wishes accord with the medical model. Drawing on psychological and sociological insights, this unique project investigates how self-management goals are negotiated and enacted, providing essential understanding of the mismatch between experts and patients. The project aims to contribute new knowledge about the complex interactions between individuals and healthcare providers and is expected to result in a way forward for more effective chronic condition self-management.

DP150103842 Stampfli, Prof Catherine M; Huang, Dr Jun; Hunger, Prof Dr Michael

2015	\$112,000.00
2016	\$110,300.00
2017	\$112,000.00
Total	\$334,300.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of Sydney

Project Summary

This joint computational-experimental project aims to address one significant global challenge of developing sustainable technologies for important chemical processes. The project expects to discover new advanced nano-catalysts via a rapid single-step process which will replace toxic and corrosive liquid acids, and low efficient solid acids, used in emerging biorefining and petrochemistry. Advanced spectroscopic studies, in synergy with state-of-the-art ab initio calculations will be used to explore nanostructure-performance relationship in depth. Such cutting-edge knowledge will have profound implications on designing innovative catalysts with tailored activity for sustainable production of biofuels and chemicals.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104227 Sunde, A/Prof Margaret

2015	\$135,000.00
2016	\$141,000.00
2017	\$146,000.00
Total	\$422,000.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Sydney

Project Summary

This project aims to use advanced biophysical techniques to study the role of hydrophobin proteins in three diseases caused by fungi. The specific focus will be on hydrophobins from fungal species that cause severe loss of rice plants, cause invasive growths in humans, and infect the eggs of endangered turtles and result in death of the turtle embryos. Hydrophobins are small fungal proteins that assemble into large biological layers at the boundary between the fungus and the host. This research aims to focus on characterising the structure of the layers, understanding how they form and how they attach to the host tissue. This work may lead to new antifungal strategies aimed at reducing the impact of these devastating fungal infections.

DP150101059 Thornber, Dr Ben J; Youngs, Prof David L; Clark, Dr Daniel S; Zhou, Dr Ye; Williams, Dr Robin J; Pino, Dr Jesse

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Sydney

Project Summary

By compressing a small sphere of deuterium-tritium using very powerful lasers in a process called inertial confinement fusion, experimentalists have produced a net gain fusion reaction for the first time. However, the gain is significantly under-predicted using the most advanced numerical tools, primarily due to the growth of fluid instabilities. Understanding and controlling the levels of instability growth is critical to achieving more efficient fusion. This international collaboration proposes to employ computations and experiments to deliver a fundamental understanding of mixing layers in implosions and explosions, to provide validation of reduced order models and contribute towards the development of the ultimate energy source.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100865 Traini, A/Prof Daniela; Spicer, A/Prof Patrick T; Young, A/Prof Paul M

2015	\$180,000.00
2016	\$181,800.00
2017	\$160,000.00
Total	\$521,800.00

Primary FoR 1115 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Organisation The University of Sydney

Project Summary

The aim of this project is to develop a particle engineering technology, based on microfluidics, that results in micro-droplets with controlled geometry and morphology. These Smartdrops will be used to target respiratory macrophages for the delivery of inflammatory suppressants, since their dimensions can be controlled to optimise lung deposition and macrophage recognition. The project aims to develop an aerosol inhaler and a series of physico-chemical and in vitro characterisation tools that will be used to study Smartdrop formation, aerosol properties and their interactions with cells. The outcome of this project is intended to be the development of a technology for treating chronic lung inflammation which could also be utilised for a number of other commercial applications.

DP150104019 Vucetic, Prof Branka; Li, A/Prof Yonghui; Heath, Prof Robert; Guo, Prof Yingjie J

2015	\$150,000.00
2016	\$153,400.00
2017	\$160,000.00
2018	\$130,000.00
2019	\$140,000.00
Total	\$733,400.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Sydney

Project Summary

It has been predicted that within the next ten years trillions of devices will connect to cellular networks and cause a thousand-fold increase in mobile traffic. This will lead to a severe spectrum shortage and congested cellular networks. Large expanses of the millimetre-wave spectrum have the potential to meet the capacity demands of future cellular networks. The project aims to develop the fundamental sciences for millimetre-wave cellular communications, which thought to be essential for the design of next generation cellular networks with data rates at least three orders of magnitude faster than those in current cellular networks. The research outcomes are expected to provide the foundations and tools for building a future mobile broadband network infrastructure in Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104897 Warr, Prof Gregory G

2015	\$142,000.00
2016	\$125,600.00
2017	\$120,000.00
Total	\$387,600.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Sydney

Project Summary

This project seeks to understand how mixtures of simple molecules can form complex structured liquids. Such mixtures occur widely both in nature and industrial settings. By using an approach combining new, high-resolution experimental techniques with computer modelling, it is expected that a detailed picture of molecular arrangements in these liquids will be obtained, allowing the relationship between composition, structure and properties to be understood for the first time. The new understanding of molecular arrangements within liquids may be used to design new solvents for chemical synthesis and catalysis, new food, personal care and pharmaceutical formulations, and new, smart materials that change their properties under external stimulus.

DP150104175 Weatherall, A/Prof Kimberlee G

2015	\$78,841.00
2016	\$52,800.00
2017	\$48,087.00
Total	\$179,728.00

Primary FoR 1801 LAW

Administering Organisation The University of Sydney

Project Summary

Intellectual property (IP) enforcement can make websites disappear, cause businesses or individuals to lose internet access, plant and equipment, stop imports or freeze technological innovation. The impact of IP on businesses and individuals depends critically on how we frame remedies and enforcement processes. These legal processes are increasingly dictated by treaty. This project aims to produce a first-of-its-kind legal analysis and conceptual synthesis of recent international and domestic developments in enforcement of patent, trade mark, copyright and other similar rights. The project intends to bring analytical rigour to highly polarised academic and policy discussions around the growth of international and domestic rules about IP enforcement.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104440 Williams, Prof Stefan B; Pizarro, Dr Oscar; Lumsdaine, Prof Andrew; Roman, A/Prof Christopher; Schechner, A/Prof Yoav

2015	\$106,000.00
2016	\$104,500.00
2017	\$113,000.00
Total	\$323,500.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Sydney

Project Summary

This project aims to develop the first photometric model of computational image formation from a mobile underwater platform, allowing the prediction of performance for conventional and computational cameras in physically grounded scenarios. The model is expected to include sufficient detail to predict key performance metrics relevant to targeted underwater imaging applications, including three-dimensional structure recovery, surface reflectance characterisation, and discrimination for automated and human-driven classification of benthic habitats. Novel imaging systems optimised for the requirements of specific marine imaging tasks are intended to be designed and constructed, exploiting the imaging model to rapidly explore the camera design space.

DP150100531 Ye, Prof Lin; Chang, Dr Li; Yang, A/Prof Chunhui; Wang, Dr Dong

2015	\$116,000.00
2016	\$111,200.00
2017	\$116,000.00
Total	\$343,200.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Sydney

Project Summary

Lightning strike presents a great threat to various engineered structures made of fibre-reinforced polymer composites. This project aims to develop fundamentals for a framework of integrity analysis for such composites after lightning strike. This involves mechanistic models for coupled electrical-thermal-mechanical analysis and experimental characterisation, addressing intensive resistant-heat generation, pyrolysis of matrices and ablation of fibres, pore gas explosion, shock stresses and prediction of residual strength. The expected outcomes of the project are critical for the development of procedures for enhanced structural integrity assessment, driving down maintenance costs and extending the life-span of engineered composite structures.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100018 Zheng, Dr Rongkun; Ringer, Prof Simon P; Li, A/Prof Xiuling

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
2018	\$30,000.00
Total	\$473,900.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of Sydney

Project Summary

Semiconductor nanowires (NWs) are nanotechnology building blocks that have the potential to transform solar cells, light emitting diodes, lasers and transistors, creating new industries in communications, energy and healthcare. The industrial development of NWs has been blocked by uncertainties in the relationships between their growth conditions, properties and atomic-scale structure. This project will address this challenge by establishing a rigorous framework for these relationships. The project aims to achieve this by harnessing the unique power of atom probe microscopy to reveal the NW structure in three dimensions, and at atomic-resolution. The project aims to place Australian research at the frontier of development of these future industries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of Technology, Sydney

DP150101214 Aubusson, Prof Peter; Schuck, Prof Sandra R; Zowghi, Prof Didar; Kearney, A/Prof Matthew; Burke, Dr Paul F; Van Leeuwen, Prof Theodoor J

2015 \$110,000.00

2016 \$105,500.00

2017 \$90,000.00

Total \$305,500.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation University of Technology, Sydney

Project Summary

Mobile technologies are ubiquitous in Australia but knowledge about their widespread effective application for school education is patchy. This research investigates the complex factors that promote or inhibit quality teaching and learning with mobile technologies in secondary schools. This project brings together multidisciplinary expertise to investigate mobile learning. It aims to support the development of effective teaching practices and school initiatives that exploit mobile technologies to improve education outcomes in mathematics and science. The project aims to establish cutting edge instruments, validated and tested in Australian contexts, which can be adapted for future large scale work in the field of technology-enhanced learning.

DP150102442 Cao, Prof Longbing; Yu, Prof Phillip S; Gaussier, Prof Eric

2015 \$130,000.00

2016 \$124,700.00

2017 \$130,000.00

Total \$384,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation University of Technology, Sydney

Project Summary

Big data features complex coupling relationships within and between diverse entities in various forms and layers. This fundamentally challenges existing learning theories, which usually assume that data is independent and identically distributed (IID). This indicates that such IID tools may either be inapplicable for big data or capture an incomplete or even biased picture of the ground truth in big data. Hence, this project aims to invent breakthrough theories and effective tools for systematically modelling and learning sophisticated couplings embedded in big data applications. The outcomes are expected to enhance Australia's leading role in data science research and lift data intelligence-driven productivity and economic growth in a changing world.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104059 Collins, Prof Jock H; Krivokapic-Skoko, Dr Branka

2015	\$60,329.00
2016	\$84,700.00
2017	\$55,095.00
Total	\$200,124.00

Primary FoR 1603 DEMOGRAPHY

Administering Organisation University of Technology, Sydney

Project Summary

The project aims to provide, for the first time, a detailed understanding of the experiences of male and female humanitarian immigrant entrepreneurs in private and social enterprises in urban and regional Australia, and critically evaluate how these entrepreneurs help redress the settlement problems and socio-economic disadvantage of humanitarian immigrants and contribute to economic growth and social cohesion in Australia. One key aim will be to further develop the theory of Diasporic entrepreneurship. The benefits are expected to include an evaluation of effective strategies and policies to improve existing humanitarian immigrant enterprises and to stimulate the creation of new humanitarian immigrant enterprises.

DP150101393 Feng, A/Prof Chongyi; Fu, Prof Hualing; Li, Prof Lianjiang

2015	\$40,000.00
2016	\$39,300.00
2017	\$40,000.00
Total	\$119,300.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation University of Technology, Sydney

Project Summary

Scholars have argued that rights lawyers have played key roles in advancing social and political change in a reforming society through defining and defending citizen rights, developing civil society, and seeking to moderate state power. However, few studies have examined the political roles or aspirations of lawyers in contemporary China. This project aims to demonstrate how Chinese 'rights defence' lawyers have drawn together diverse strands of social protest to become an articulating voice for constitutional reform. The project aims to make both empirical and theoretical contributions to the world-wide debate on the interaction between rights lawyers, rule of law, social activism and political reform.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104491 Goeree, Prof Dr Jacob K

2015	\$143,000.00
2016	\$141,900.00
2017	\$152,000.00
Total	\$436,900.00

Primary FoR 1401 ECONOMIC THEORY

Administering Organisation University of Technology, Sydney

Project Summary

Game theory is increasingly being used in the social sciences, but the extreme reliance on perfect decision making and perfect foresight has raised doubts about its empirical relevance. This scepticism is reinforced by laboratory evidence showing behaviour patterns that are systematically biased away from game-theoretic predictions. This project concerns the development and testing of models more descriptive of actual human behaviour. One aim is to deliver hybrid models able to reproduce interesting patterns of first-period play (introspection), time-series data in repeated games (learning), and systematic departures from static equilibrium. Another aim is to apply a successful hybrid to improve the design of economic and social institutions.

DP150102062 Harry, Prof Elizabeth J; Sonenshein, Prof Abraham L

2015	\$145,000.00
2016	\$128,500.00
2017	\$140,000.00
Total	\$413,500.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation University of Technology, Sydney

Project Summary

Bacteria are simple organisms, yet we still do not understand how they coordinate their growth with their reproduction so faithfully, generation after generation, to produce viable newborn cells. The new discovery of a link between the food bacteria eat and the first stage of their cell division now provides the opportunity to elucidate how bacteria 'measure' their energy production to control their proliferation. This project combines the latest technology with complementary expertise in bacterial cell division and metabolism. This should identify the mechanism that integrates these fundamental pathways in bacteria, crucial to both their survival and ability to cause infection.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102935 Karpin, Prof Isabel A; O'Connell, Dr Karen

2015	\$71,801.00
2016	\$68,100.00
2017	\$58,315.00
2018	\$74,445.00
Total	\$272,661.00

Primary FoR 1801 LAW

Administering Organisation University of Technology, Sydney

Project Summary

People who exhibit socially challenging behaviour are increasingly defined in law as having a disability. This project explores the problem of how law should respond to this growing cohort, a problem that becomes more acute as advances in genetics and the brain sciences expand the set of socially unacceptable behaviours that are identified as biologically based. Using detailed case studies of the regulation of genetic screening of embryos for disability and the application of disability discrimination law to behavioural traits, the project is expected to determine how, if at all, law should regulate variant personality and behaviour.

DP150101645 Lu, Prof Jie; Zhang, A/Prof Guangquan; Lin, Prof ChinTeng

2015	\$104,000.00
2016	\$99,700.00
2017	\$104,000.00
Total	\$307,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation University of Technology, Sydney

Project Summary

Unforeseeable changes to patterns that underlie data (concept drift) occur in all organisational data, and in unstructured data, making subsequent data-driven prediction less accurate as time passes, which leads to poor decision outcomes. To solve these problems, this project aims to develop novel fuzzy competence models to reflect concept drift, with methods to detect and react to changes, and integrate them into Decision Support Systems (DSS) to provide adaptivity for ever-changing environments. These cutting-edge results are intended to be directly used to enhance organisational real-time data analytics and dynamic decision making, and are expected to significantly contribute to information science by introducing a new research field, adaptive data-driven DSS.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101057 Millbank, Prof Jenni; Karpin, Prof Isabel A; Stuhmcke, Prof Anita; Jackson, Prof Emily; Mykitiuk, A/Prof Roxanne

2015	\$98,000.00
2016	\$117,000.00
2017	\$106,500.00
2018	\$100,000.00
Total	\$421,500.00

Primary FoR 1801 LAW

Administering Organisation University of Technology, Sydney

Project Summary

Australia is wrestling with the complex challenges posed by the increase in cross-border reproductive care. This project asks: what are the causes and consequences of Australians being excluded from, or choosing to evade, regulated assisted reproductive treatment? The research aims to identify barriers to the pathways to licensed assisted reproductive treatment and motivations for evasion of regulation. It entails a series of interlinked case studies reflecting the life-cycle of family formation in assisted conception. The aim is to develop solutions for more responsive legal frameworks that encourage beneficial clinical and ethical practices and contain harmful ones through inclusion rather than exclusion.

DP150102493 Nguyen, Prof Hung T; Craig, Prof Ashley

2015	\$78,000.00
2016	\$75,800.00
2017	\$81,000.00
Total	\$234,800.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation University of Technology, Sydney

Project Summary

This project aims to develop intelligent decision-making systems for non-invasive identification of adverse neural events (fatigue/freezing of gait) through real-time monitoring of brain wave activity. Analyses of the effectiveness of the changes in physiological parameters associated with electroencephalography (EEG) signals, advanced biomedical instrumentation, and optimal computational intelligence will form a basis for the development of platform technology capable of monitoring and detection of neural health status. Success is expected to yield a new generation of smart dynamic non-invasive systems that will be critical for developing effective solutions to counter life threatening conditions for a large cross section of the Australian population.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102758 Novikov, Prof Alexander; Borovkov, Prof Konstantin; Klebaner, Prof Fima C; Mishura, Prof Yuliya

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0104 STATISTICS

Administering Organisation University of Technology, Sydney

Project Summary

The project aims to develop new approaches using infinite-dimensional Markov processes to solving important long-standing problems from the theory of long memory random processes and their applications. It aims to: construct a class of new representations of random processes; derive inequalities for the key numerical characteristics; and, devise and investigate numerical methods for computing the characteristics and for performing statistical inference on the long memory models. The accuracy of numerical approximations will be analysed using simulations on supercomputers. Expected outcomes include models and results of practical importance with applications such as intrusion detection problems, cell motility for biological data and telecommunication.

DP150103317 Phillips, Prof Matthew R; Ford, A/Prof Michael J; Ton-That, Dr Cuong

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation University of Technology, Sydney

Project Summary

Light emitting diode (LED) devices play a critical role in emerging technologies with important current and future applications in medicine, health, horticulture, nanotechnology, biology and photonics. The basic laws of optics, however, only allow a very small amount of light to escape their surfaces due to very strong intrinsic internal reflection. This project aims to optimally couple light by design to nanostructured metal - low loss zinc oxide surface coatings to significantly improve the light extraction efficiency. These breakthroughs in nanoscience and nanotechnology are expected to lead to enhanced LED performance, efficiency and longevity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103137 Reimers, Prof Jeffrey R; Krausz, Prof Elmars R; Freiberg, Prof Arvi

2015	\$135,000.00
2016	\$129,500.00
2017	\$130,000.00
Total	\$394,500.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation University of Technology, Sydney

Project Summary

This project aims to determine the nature and role of the lowest-energy excited states in most natural photosynthetic reaction centres and light-harvesting complexes. The lowest-energy states of bacterial reaction centres are critical to function and are used as a paradigm in artificial organic solar-energy capture, but for most photosystems their nature remains unknown. The project aims to answer the critical question of why they do not actually prevent function. It is expected that both the outcomes obtained and techniques developed will be directly relevant to solar-energy device design. The project will apply five existing, complimentary and purposely built spectrometers as well as quantum electronic and nuclear simulation techniques to identify and characterise three key systems.

DP150103544 Sun, Prof Wanning

2015	\$42,200.00
2016	\$45,600.00
2017	\$95,456.00
Total	\$183,256.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation University of Technology, Sydney

Project Summary

China's global ascendancy seems unstoppable. But its economic reforms have made China one of the world's most unequal countries. To a significant extent, the nation's stability and global prosperity now rest precariously on the goodwill of more than 260 million mostly disadvantaged rural migrant workers, and how they feel and act. But how do they experience inequality? How does inequality shape their most intimate feelings? This project aims to demonstrate unequivocally that love and romance are far from 'trivial' for these individuals: studying them is not a retreat to the merely personal, but rather promises vital new ways of understanding inequality.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101377 Vigneswaran, Prof Saravanamuthu; Kandasamy, A/Prof Jaya K; Fane, Prof Anthony G; Wang, A/Prof Rong N; Moon, Prof Hee

2015	\$110,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$315,700.00

Primary FoR 0907 ENVIRONMENTAL ENGINEERING

Administering Organisation University of Technology, Sydney

Project Summary

Disposal of rejected brine from seawater reverse osmosis desalination plants causes major pollution problems and existing solutions are expensive. Recovery of valuable metals such as rubidium (Rb) after further concentration of the brine will lead to environmental and economic benefits. This project aims to develop a novel electrospun nanofibre membrane distillation membrane to economically concentrate the brine and to develop novel adsorbents and desorbents to recover the valuable Rb. It is expected that the concentration and recovery of Rb will lead to a sustainable way of handling the brine, as the concentration cost can be offset by the selling of Rb.

DP150102751 Zhang, Prof Nong; Walker, Dr Paul D

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0902 AUTOMOTIVE ENGINEERING

Administering Organisation University of Technology, Sydney

Project Summary

This project studies a newly proposed clutchless power-shifting transmission (CPT) for hybrid and electric vehicle applications. It aims to design new methods and actuators for power-on gear change to realise the best possible performance of the CPT, and through simulation and experimentation evaluate the system performance and response under both steady state and transient conditions. The proposed transmission is expected to significantly reduce the efficiency losses present in modern vehicles and establish new techniques for achieving gear and mode changes that do not rely on friction clutches. It is anticipated that these novel technologies will provide new direction for developing the next generation of very high efficiency automotive power train technologies.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of Western Sydney

DP150104600 Davis, Prof Christopher W; Kim, A/Prof Jeesun

2015 \$100,000.00

2016 \$100,700.00

2017 \$105,000.00

Total \$305,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation University of Western Sydney

Project Summary

This project adopts an innovative approach to understand problems that elderly people have in recognising speech in noise. Using a detailed computational (glimpsing) model, measures of auditory and visual information and novel priming methods, the project aims to determine precisely what processing is carried out in the early stages of perception. Quantifying and systematically varying input information and measuring perceptual processing are essential for pinpointing where speech perception problems arise and provide a foundation for evaluating remediation and training. This research aims to contribute to theories of speech recognition and has practical application for speech assessment.

DP150102285 Gibson, Prof Katherine D; Law, Dr Lisa B; Occeña-Gutierrez, A/Prof Darlene; Win Oo, Prof Dr Nay

2015 \$59,000.00

2016 \$86,300.00

2017 \$52,000.00

Total \$197,300.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation University of Western Sydney

Project Summary

Sharing, reciprocity and resource pooling are at the frontline of recovery and relief when economic crisis or disaster hits Monsoon Asia. This research aims to shed light on cases where these economic practices have been innovatively harnessed to diversify livelihoods and build economic resilience. Working with contemporary Asian scholars, practitioners in the disaster field and a data set gleaned from multiple sources, including mid-20th century tropical geography texts, the project aims to bring to the fore a regional landscape of diverse economic practices across Monsoon Asia. A cross-regional on-line knowledge community is expected to be formed to explore how this asset base might be mobilised towards more effective local development and disaster response.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102055 Howell, Prof Julia D; Woodward, A/Prof Mark

2015	\$65,000.00
2016	\$59,200.00
2017	\$61,000.00
Total	\$185,200.00

Primary FoR 2204 RELIGION AND RELIGIOUS STUDIES

Administering Organisation University of Western Sydney

Project Summary

This project is the first systematic investigation of a new type of counter-radical religious mobilisation in Muslim Southeast Asia: mass prayer rallies attended by tens of thousands of people and led by charismatic preachers of Hadhrami Arab descent. While transnational Islamist movements promoting an Islamic state have identified 'true Islam' with Arab practices, Hadhrami leaders of the new-style prayer rallies publicly resist such claims, promoting religious rituals beloved in Indonesian local Islam. This project seeks to document the scope and impact of the new-style prayer rallies and understand them as new religious forms responsive to the late-modern social changes affecting not just the West, but also Islamic Southeast Asia.

DP150102652 Kwok, Prof Kenny C; Macefield, Prof Vaughan G; Walton, Dr Darren K

2015	\$140,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$414,300.00

Primary FoR 1204 ENGINEERING DESIGN

Administering Organisation University of Western Sydney

Project Summary

Current building motion design guidelines focus primarily on motion perception and complaint rates. However, wind-induced building motion can cause s漂te syndrome or early onset motion sickness which adversely affects occupant wellbeing and work performance. This research aims to advance the understanding of the physiology of s漂te syndrome, quantify the motion dosage that causes s漂te syndrome and determine its adverse effects on building occupants in real-world motion environments. This knowledge is expected to guide the formulation of building motion acceptability criteria based on safe motion exposure duration to facilitate the design of tall building that promotes population health and wellbeing and lifts work performance and productivity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104199 Nielsen, Dr Uffe N; Eldridge, Dr David J; Singh, Prof Brajesh K

2015	\$165,000.00
2016	\$111,200.00
2017	\$144,000.00
Total	\$420,200.00

Primary FoR 0602 ECOLOGY

Administering Organisation University of Western Sydney

Project Summary

This project aims to use an experimental approach to determine how rainfall regime structures dryland communities and ecosystem properties and potential responses to altered rainfall regime. Ecosystem functioning in drylands is governed by complex interactions between microbes, invertebrates and plants. Biological activity however is constrained by the availability of water and altered rainfall regimes that could moderate how organisms interact, potentially causing trophic cascades and even ecosystem state changes. By linking observed responses with soil microbial functional attributes using newly developed molecular techniques the project seeks to provide a mechanistic insight into ecosystem responses to climate variability and extreme climatic events.

DP150101015 Tam, A/Prof Vivian W; Le, Dr Khoa N; Shen, Prof Li-Yin

2015	\$63,312.00
2016	\$60,700.00
2017	\$63,312.00
Total	\$187,324.00

Primary FoR 1202 BUILDING

Administering Organisation University of Western Sydney

Project Summary

In Australia, the annual average temperature has increased 0.9 degrees Celsius since 1910. Residential and commercial building sectors produce about 23 per cent of the national greenhouse-gas emissions. This project critically evaluates the cost effectiveness and greenhouse-gas emissions of green-building implementation in Australia. This will examine methods to lower cost and greenhouse-gas emissions from green-building implementation. A new high-tech scoring model is expected to be developed to identify cost-effective and low-greenhouse-gas-emissions methods to achieve specific green-star status for the Australian building and construction industries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of Wollongong

DP150104279 Bouzerdoum, Prof Abdesselam; Amin, Prof Moeness

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$100,000.00
2019	\$100,000.00
Total	\$495,900.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation University of Wollongong

Project Summary

The aim of this project is to develop radar imaging techniques which enable us to 'see' objects behind walls and opaque materials. The major intended breakthrough is the ability to image objects behind walls and inside buildings or enclosed structures without accessing the scene. Novel signal and image processing algorithms, based on Bayesian compressive sensing, will be developed to enhance image quality and resolution, improve speed of operation, and reduce the cost and time of data acquisition and processing. Many applications are expected to benefit from this research including search and rescue, surveillance, security, and defence. The research outcomes are expected to enhance the capabilities of the Australian armed forces, counter-terrorism, police and law-enforcement agencies.

DP150104576 Cressie, Prof Noel A

2015	\$140,000.00
2016	\$127,500.00
2017	\$135,000.00
Total	\$402,500.00

Primary FoR 0104 STATISTICS

Administering Organisation University of Wollongong

Project Summary

By their very nature, environmental processes involve strong spatial and temporal variability. Inferring cause-effect relationships requires the incorporation of spatial and temporal dependence in the statistical models. The aims of this project are to develop mass-balanced hierarchical spatio-temporal statistical models, new loss functions that are relevant to multivariate processes, and optimal estimators obtained from the hierarchical model's predictive distribution. These methodologies are intended to be applied to the estimation of near-surface fluxes of atmospheric carbon dioxide, using massive remote sensing datasets from satellites and other data sources.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102562 **Davidson, Dr Guy R**

2015	\$52,226.00
2016	\$39,700.00
2017	\$32,865.00
Total	\$124,791.00

Primary FoR 2005 LITERARY STUDIES

Administering Organisation University of Wollongong

Project Summary

In post-war America, the writers James Baldwin, Truman Capote, Gore Vidal and Tennessee Williams were all assumed to be homosexual in the days before this became relatively "safe," yet they all attained celebrity status. This project aims to examine the effect that the presence of these literary celebrities had on the formation of contemporary gay identity. In doing so, the project aims to demonstrate the inadequacy of the analytic categories of the open secret and the closet, conventionally used in sexuality studies to explain gay identity in the post-war years before gay liberation. The project endeavours to contribute to our understanding of two vital and interrelated aspects of contemporary society: celebrity culture and gay identity.

DP150100116 **Hagenbuchner, Dr Markus; Trost, Dr Stewart G; Cliff, Dr Dylan P**

2015	\$88,838.00
2016	\$94,700.00
2017	\$102,886.00
Total	\$286,424.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation University of Wollongong

Project Summary

This interdisciplinary project explores novel machine learning approaches to modelling physical activity data in preschool children. The approach taken is considered the future of physical activity assessment and is expected to substantially enhance the measurement of physical activity and the evidence base that informs strategies to improve population health through physical activity promotion. The project aims to transform the understanding of young children's physical activity behaviour, and is expected to have important implications for the design of accurate and effective technology-based physical activity monitoring and intervention applications that could be delivered through the e-health initiative in Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102732 Jiang, Prof Zheng Y; Wei, Dr Dongbin; Zhao, Dr Jingwei

2015	\$125,000.00
2016	\$113,200.00
2017	\$130,000.00
Total	\$368,200.00

Primary FoR 0910 MANUFACTURING ENGINEERING

Administering Organisation University of Wollongong

Project Summary

The aim of this project is to develop a novel micromanufacturing technology to produce composite micro drills with desirable properties and reduced production costs. The developed micro drills have significant applications for the printed circuit board industry, medical devices, personal computers, mobile phones and digital cameras. The expected outcomes include optimisation of the micromanufacturing process for improved properties of composite micro drills and an enhanced awareness of the mechanics of micromanufacturing composite micro drills to increase reliability in subsequent micro drilling processes. The outcomes have the potential to contribute to the competitiveness of Australia's manufacturing industry.

DP150103727 Jones, Prof Sandra C; Croft, Prof Rodney J

2015	\$88,889.00
2016	\$86,600.00
2017	\$113,712.00
Total	\$289,201.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation University of Wollongong

Project Summary

Young Australian women are drinking more and drinking in more harmful ways. At the same time, advertisers are using new media (such as social network sites) and messages (such as empowerment) to advertise alcohol to women. Using a combination of quantitative, qualitative and experimental methods, this project will explore how alcohol is advertised to Australian women (in both traditional and new media), and how this influences their alcohol-related attitudes and behaviours. Answering these questions is expected to enable development of recommendations for regulation of alcohol advertising messages, creation of counter-advertising/social marketing messages, and production of alcohol advertising literacy programs for secondary and tertiary students.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102636 Li, Prof Weihua; Li, A/Prof Jianchun

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation University of Wollongong

Project Summary

Base isolation is of great importance for the safety of infrastructure, such as hospitals, bridges and nuclear power plants. Utilisation of a traditional passive base isolator makes the base isolation system vulnerable and susceptible to unexpected/extreme dynamic loadings, such as earthquakes. This project aims to address this critical issue through the development of a novel adaptive seismic isolator working with an innovative stiffness softening magnetorheological elastomer (MRE). This research represents a fundamental step towards the understanding of MRE behaviour and is expected to be the breakthrough for the development of a future smart base isolation system.

DP150101081 Mackie, Prof Vera C; Ferber, A/Prof Deborah S; Marks, Dr Nicola J

2015	\$183,119.00
2016	\$172,300.00
2017	\$163,534.00
Total	\$518,953.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation University of Wollongong

Project Summary

The 40th anniversary of the birth of the first baby conceived through in vitro fertilisation (IVF) will occur in 2018. This project aims to produce a history of IVF and the range of assisted reproductive technologies with which it is associated. These new forms of conception, gestation and parenting have transformed understandings of the family and have led to regulatory and policy responses and public debate, which can only be understood in a global frame. A series of transnational case studies, with a special focus on the Asia-Pacific region, will be designed to explore the development of the present consumer, medical and regulatory environments and provide a historically informed basis for dealing with policy deliberations locally and internationally.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100375 McCoy, Dr James A; Wheeler, Dr Glen E; Andrews, Prof Benjamin H

2015	\$145,000.00
2016	\$144,800.00
2017	\$161,000.00
Total	\$450,800.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation University of Wollongong

Project Summary

This project aims to analyse higher order geometric partial differential equations that have important mathematical applications in differential geometry of submanifolds as well as practical applications in physics and mathematical biology. The project aims to prove new general principles that reveal properties of these higher order elliptic and parabolic partial differential equations, producing a unified framework with applications to various specific problems. This project aims to increase Australia's research capacity in geometric evolution problems, provide training for some of Australia's next generation of mathematicians and build Australia's international reputation for significant research in geometric analysis.

DP150103082 McLean, Prof Ian A; McHugh, Dr Siobhan A; Neale, Ms Margo

2015	\$30,000.00
2016	\$43,500.00
2017	\$48,759.00
Total	\$122,259.00

Primary FoR 1901 ART THEORY AND CRITICISM

Administering Organisation University of Wollongong

Project Summary

The paradigms developed by scholars have a huge impact on the value of art. After the Australian artworld repositioned Aboriginal art from the frame of 'primitive art' to that of contemporary art, the price of and market for Aboriginal art increased enormously. However, Aboriginal art failed to penetrate the international contemporary artworld because the paradigms of contemporary art within which it was framed were outmoded. Through examining the production of Aboriginal art from the perspectives of its producers and recent globalised contemporary art practices, this project aims to develop a new theory of Aboriginal art that is more aligned with the thinking of current curators who set the agenda at the upper end of the market.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101715 Mitchell, A/Prof Todd W; Blanksby, Prof Stephen J

2015	\$180,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$434,700.00

Primary FoR 0301 ANALYTICAL CHEMISTRY

Administering Organisation University of Wollongong

Project Summary

Recent discoveries suggest that the number and structural variety of lipids in nature may be far greater than previously imagined. This complexity arises from the presence of structurally similar, but functionally distinct, lipid isomers that are not readily distinguished using current lipidomics technologies. This project aims to develop unique instrumentation that combines ion mobility and mass spectrometry to enable the rapid separation, identification and quantification of isomeric lipids. These next generation technologies will be deployed in the hope of unmasking the molecular diversity within the lipidomes of two important mammalian cell types, thus providing fundamental new insights into the structure and function of lipids within living systems.

DP150104532 Officer, Prof David L; Wagner, Dr Pawel; Wagner, Dr Klaudia K; Diamond, Prof Dermot; Gordon, Prof Keith C; Florea, Dr Larisa

2015	\$140,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$394,700.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation University of Wollongong

Project Summary

The controlled transport of chemical species in fluidic systems is essential to the functioning of living systems. Emulating cellular transport processes in synthetic fluidic systems, so as to allow the controlled transport of reagents or products from one site to another, has the potential to add revolutionary capabilities to fluidic platforms. This project will explore the potential and limits of chemopropulsion and its use as a driving mechanism for cargo-carrying vehicles in fluids. The resulting fluidic transport systems could be used to transport medicine in the human body, act as chemical messengers for signal transduction in sensing or other systems or move cargo around microfluidic devices.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101598 Sims, Prof Aidan D; Pask, A/Prof David A; Hazrat, Dr Roozbeh

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation University of Wollongong

Project Summary

This pure mathematics project focuses on the interplay between abstract algebra and the area of functional analysis known as operator algebras. Specifically, it is intended to deal with generalisations of graph C^* -algebras and of Leavitt path algebras. Over the last decade, researchers have discovered striking similarities between these areas, but no unifying result that would allow them to transfer techniques and theorems systematically from one to the other. Recent research suggests that groupoid models for both algebras and C^* -algebras may provide the missing link. This project aims to determine the role of groupoids in the two theories, and analyse and exploit the resulting synergies between abstract algebra and operator algebras.

DP150101595 Sims, Prof Aidan D

2015	\$115,000.00
2016	\$110,300.00
2017	\$120,000.00
Total	\$345,300.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation University of Wollongong

Project Summary

This project is in pure mathematics, in the broad area of functional analysis, and focuses specifically on operator algebras. Kubo-Martin-Schwinger (KMS) states on operator algebras encode equilibria of C^* -algebraic dynamical systems. This project aims to take a novel view of KMS data as a repository of fine operator-algebraic structure. It aims to develop a theory whereby KMS states recover structural details like primitive-ideal structure and simplicity. The project is expected to determine to what extent the KMS simplex of combinatorial operator algebra remembers underlying combinatorial data. It also aims to explore KMS states on combinatorial operator algebras as a new point of interaction between the two main branches of modern operator-algebra theory.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103718 Tieu, Prof Kiet A; Zhu, Dr Hongtao; Wang, Prof Liping; Wan, Dr Shanhong

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
2018	\$115,000.00
Total	\$455,300.00

Primary FoR 0913 MECHANICAL ENGINEERING

Administering Organisation University of Wollongong

Project Summary

The project proposes a new composite phosphate-polymer lubricant in aqueous solution for metal forming at high temperature. The lubricant is self-adaptive to the high pressure, shear and temperature, and will provide threefold synergistic functions: desired tribological performance (anti-wear and low friction); cooling effect; and, oxidation inhibition. This has the potential to significantly reduce overall costs, improve product quality and lead to a cleaner working environment within the Australian manufacturing industry.

DP150100956 van Oijen, Prof Dr Antoine M; Dixon, Prof Nicholas E

2015	\$248,903.00
2016	\$240,900.00
2017	\$288,988.00
Total	\$778,791.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation University of Wollongong

Project Summary

This project aims to develop and use a suite of new single-molecule techniques to define how the bacterial replisome really works. The replisome is the machine that makes DNA in cells that are about to divide. Replisomes have many mechanistic challenges as they work to copy both strands of DNA at the same time. Many years of classic biochemical studies have worked out how many of these challenges are overcome. In recent years, the use of single-molecule biophysical techniques has begun to challenge many aspects of the elegant textbook view of replisome function. This approach is expected to reveal how synthesis of the two DNA strands in different directions at the same time is coupled together and how timing mechanisms work.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101936 Woodroffe, Prof Colin D; Murray-Wallace, Prof Colin V; Kennedy, Dr David M; Tamura, Dr Toru; Nichol, Dr Scott L; McBride, Dr Randolph A

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0406 PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Administering Organisation University of Wollongong

Project Summary

This project aims to reconstruct sedimentary processes and evolution of key coastal plains in southern Australia. These low-lying coasts, and the settlements and infrastructure on them, are vulnerable to inundation and shoreline erosion. Past behaviour of different types of coasts will be determined by combining innovative geospatial techniques to map morphology and past changes, geophysical imaging of stratigraphy and geochronology. The outcome will be models that explain responses to sediment availability, past storm history and sea-level changes. This will benefit sustainable coastal planning and management, providing geomorphological evidence to support erosion hazard assessments of these and adjacent coasts.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Victoria

Deakin University

DP150101115 Bastin, A/Prof Rohan N; De Silva, Prof Dr Delkadura Arachchige P; Kapferer, Prof Bruce

2015 \$135,755.00

2016 \$174,200.00

2017 \$118,000.00

Total \$427,955.00

Primary FoR 1601 ANTHROPOLOGY

Administering Organisation Deakin University

Project Summary

This project proposes comparative research on socio-religious reform movements in Sri Lanka, exploring four separate yet related research foci in the post-war context involving each of the major world religions (Buddhism, Hinduism, Christianity and Islam). It explores questions of human equality and social cohesion in the setting of post-conflict national reconstruction. The project is significant as an innovative, simultaneous study of Sri Lankan religion combined with an examination of the relationship between religion and social difference, inclusion and exclusion. Involving four PhDs from Sri Lanka and Australia working with experienced anthropologists from each country, the project aims to produce a significant ongoing international collaboration.

DP150102346 Chen, Prof Ying I; Zhi, Asst Prof Chunyi

2015 \$110,000.00

2016 \$105,500.00

2017 \$110,000.00

Total \$325,500.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Deakin University

Project Summary

This research aims to develop novel efficient absorbent materials from porous boron (carbon) nitride (B(C)N) nanosheets, which are new two-dimensional (2D) nanomaterials consisting of a few atomic layers. The porous B(C)N nanosheets have a large surface area and a strong selective adsorption property. In addition, they can be regenerated and re-used for many times due to high thermal stability. This project aims to synthesise these nanosheets with controlled nanoporous structures. Applications for removing pollutants from water and air will be evaluated. The outcomes are expected to advance our knowledge in 2D nanomaterials, create new technologies for cleaning-up of oil spillage and contaminated water, and provide benefits for environmental protection.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102817 Endler, Prof John A

2015	\$180,000.00
2016	\$172,600.00
2017	\$180,000.00
2018	\$180,000.00
Total	\$712,600.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation Deakin University

Project Summary

This project aims to use altered light in laboratory and wild guppy populations to test directly the following questions: which traits evolve quickly or slowly and how does this depend upon their functional interactions, and how often do different solutions to the same environmental challenges evolve? The evolutionary effects of environmental change on gene regulation and functional interactions among traits are virtually unknown. Using evolution experiments, this project aims to explore traits with known functional links: opsin gene regulation patterns (for colour vision), colouration, and colour-based choice. It is expected that vegetation changes cause immediate environment changes, directly affecting animals' abilities to choose mates, forage, and avoid predation.

DP150102089 Hobbs, Dr Linda M; Whannell, Dr Robert; Tytler, Prof Russell W; Vale, A/Prof Colleen M; Quinn, Dr Frances C; Campbell, A/Prof Coral J; Lyons, A/Prof Terry S

2015	\$80,000.00
2016	\$71,900.00
2017	\$75,000.00
Total	\$226,900.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation Deakin University

Project Summary

Teaching out-of-field (teaching a subject without qualifications) is a rising concern internationally, and is linked to attrition, stress, and reduced student learning outcomes. With a comparatively high percentage of out-of-field teachers, Australia is exposed to significant social, economic and educational costs. Through the development of longitudinal case studies, this project investigates the changing landscape of teacher perceptions and practices over three years, within school institutional cultures relating to teacher assignment, support, and out-of-field mathematics and science teaching. Outcomes of the project will aim to inform the development of system and school policy and practice, in dealing with this internationally pervasive issue.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103062 Hodgson, Prof Peter D; Timokhina, Dr Ilana; Miller, Dr Michael K

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation Deakin University

Project Summary

Formation of interphase nanoparticles and clusters is a new approach to increase strength in advanced high strength steels. Exceptionally high strength levels can be achieved in alloys that only have solute clusters by controlling the temperature-time history. However, the exact mechanism for the formation of clusters and precipitates and the cluster strengthening mechanism are not understood, nor do we know how to control cluster formation. This project aims to develop a fundamental understanding of the formation of clusters and nanoprecipitates and determine their contribution to strengthening and other mechanical properties using advanced characterisation techniques such as atom probe tomography and electron microscopy.

DP150100441 Miller, A/Prof Peter G; Chikritzhs, Prof Tanya; Kypri, Prof Kypros; Graham, Prof Kathryn

2015	\$164,000.00
2016	\$220,200.00
2017	\$73,000.00
Total	\$457,200.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Deakin University

Project Summary

Alcohol-related harm is a major public health and social order issue which requires sophisticated evidence-based policy. This project capitalises on a unique window of policy adoption across Australia to investigate the introduction of risk-based licensing schemes for the sale of alcohol, assessing their impacts, identifying modifiable elements and developing policy advice. There is an urgent need for evidence about which interventions are effective, and which of these can survive the political process. It builds on the team's extensive work and unique datasets around alcohol policy and licensed venues to analyse archival data, key stakeholder interviews and venue observations in three states, using the most up-to-date and reliable methods.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100031 Phung, A/Prof Dinh Q; Venkatesh, Prof Svetha; Kumar, Prof Mohan J

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation Deakin University

Project Summary

Pervasive health monitoring devices provide a rich data source with opportunity to continuously extract patterns and guide individuals towards their goals of wellbeing. To exploit this nexus between machine learning and pervasive computing, this project aims to solve the computational problems to analyse data from such wearable devices, applying rigorous statistical models to discover latent patterns and groupings. The significance lies in solving fundamental problems related to heterogeneous, multi-level, mixed-type time series data. The proposed outcomes are expected to enable monitoring of people 'in the wild', away from doctors and hospitals, thus significantly reducing the burgeoning cost of hospital visits and stays.

DP150100690 Shi, Prof Guang R; Chen, Prof Zhong Q; Shen, Prof Shuzhong; Xie, Prof Shucheng

2015	\$105,000.00
2016	\$105,500.00
2017	\$105,000.00
Total	\$315,500.00

Primary FoR 0403 GEOLOGY

Administering Organisation Deakin University

Project Summary

Global warming is predicted to form 'sick seas' and cause widespread stunted growth of taxa and ecosystem-wide dwarfism. Exactly how this works requires substantiation of both short-term empirical and experimental research as well as evidence from the deep-time fossil record. Using the high-resolution marine fossil record from the Permian-Triassic mass extinction ~252 million years ago, the most severe in the history of animals, this project will investigate how body size of marine species and communities evolved in response to the mass extinction and rapid global warming. It is expected that the project findings will help better understand the links between global warming, anoxia, hypercapnia, euxinia, ocean acidification, and species adaptation and evolution.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100406 Wang, Dr Hongxia; Zhao, Dr Yan; Rutledge, Prof Gregory C

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
Total	\$236,700.00

Primary FoR 0910 MANUFACTURING ENGINEERING

Administering Organisation Deakin University

Project Summary

Self-cleaning surfaces offer an easy to maintain, environmentally friendly way of keeping surfaces clean - important for daily life, healthcare and industry. Using a water-phase process to prepare durable, self-cleaning (based on superamphiphobicity) surfaces is highly promising for practical uses, but remains challenging to perform. The present work aims to develop new knowledge on how to create superamphiphobic, self-cleaning surfaces using a marine-mussel-inspired dopamine underwater assembly principle. The new technology developed is expected to be useful for wide production of durable self-cleaning coatings for diverse applications.

DP150103732 Xiang, Prof Yang

2015	\$91,000.00
2016	\$87,300.00
2017	\$91,000.00
Total	\$269,300.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation Deakin University

Project Summary

As the internet traffic data exponentially increases every year, traffic classification has become a fundamental approach to the security of the Internet. This project aims to develop a set of novel techniques for internet traffic classification, which is fundamentally important to defend against the serious cyber-attacks and effectively minimise the damages. This project is significant as it can help to improve cyber security, which is essential for the work and daily lives of the Australian people. Furthermore, the proposed models and techniques will be important for enhancing the protection of Australian critical infrastructures against malicious cyber-attacks.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

La Trobe University

DP150104386 Anderson, Prof Marilyn A; van der Weerden, Dr Nicole L

2015	\$139,000.00
2016	\$135,200.00
2017	\$149,000.00
Total	\$423,200.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation La Trobe University

Project Summary

The plant defensin nicotinamide adenine dinucleotide dehydrogenase subunit 1 (NaD1) has potent antifungal activity against agricultural and human pathogens and has potential in the treatment of serious diseases that affect crop production and human health. NaD1 has been found to permeabilise membranes and allows entry of other molecules into the fungal cytoplasm. While screening for molecules that enhance the activity of defensins a number of proteinase inhibitors were identified that act synergistically with NaD1. This project aims to identify the molecular basis of this synergy which is expected to lead to better control of fungal diseases of crops and in humans.

DP150100586 Cosgrove, A/Prof Richard F; Garvey, Dr Jillian M; Webb, Dr John A

2015	\$119,078.00
2016	\$88,600.00
2017	\$82,579.00
2018	\$66,065.00
Total	\$356,322.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation La Trobe University

Project Summary

This project examines the archaeology of Aboriginal people in eastern Tasmania. Its major aim is to test two models of Holocene and late Pleistocene land use. It investigates the earliest traces of human occupation in eastern Tasmania and subsequent cultural developments after the apparent abandonment of southwest Tasmanian caves at the end of the ice age. The study aims to strengthen understanding of the impact of geographic connectedness and isolation on Aboriginal populations and the development of Tasmanian Aboriginal society recorded at European contact. Its potential significance lies in contributing to debates on Aboriginal social/economic change and stasis.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103666 Dowsett, Prof Gary W; Duncan, Dr Duane; Angelides, Dr Steven

2015	\$81,754.00
2016	\$74,700.00
2017	\$83,679.00
Total	\$240,133.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation La Trobe University

Project Summary

Australian men are under increasing pressure to appear fit, with psychologists and others identifying body dissatisfaction, depression, and illegal supplement use as evidence of a 'crisis'. However, no research has explored men's emotional and physical investments in injunctions to be 'healthy', or relatively new opportunities in consumer culture for men to style the body. This qualitative project aims to explore men's motivations for engaging in body image-enhancing practices. It expects to provide insight that will benefit those engaged in advocating healthy lifestyles to men.

DP150102287 Heras, Dr Begoña; Schembri, Prof Mark A

2015	\$110,000.00
2016	\$108,400.00
2017	\$115,000.00
Total	\$333,400.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation La Trobe University

Project Summary

Autotransporters are a large family of bacterial proteins that play a central role in pathogenesis. They promote the formation of cell clusters and biofilms, which are mechanisms for bacterial resistance to host immune factors and antibiotics. Currently, the precise mode of action of autotransporters is unknown. This project will examine the interplay between the structure and function of key autotransporter proteins. It is expected that the outcomes of this research will establish how these proteins mediate aggregation and biofilm formation. It may also provide three-dimensional structures of proteins that are strongly immunogenic and may represent targets for future vaccine design, as well as identify molecules that inhibit autotransporter function.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100508 Hoebee, Dr Susan E; Weston, Dr Peter H; Edwards, Dr Trevor J

2015	\$80,000.00
2016	\$76,700.00
2017	\$30,000.00
2018	\$31,000.00
Total	\$217,700.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation La Trobe University

Project Summary

The project aims to investigate the evolutionary history and conservation status of a group of closely related Grevillea species, in the light of increasing pressure from landscape modification. This project will incorporate leading methodologies for massively parallel sequencing, pollinator preference and breeding capacity in order to detect the patterns and processes underpinning divergence in widely distributed species. A phylogenetic framework will provide the evolutionary relationships among taxa. This project is expected to inform requirements for long-term species persistence and, for threatened species within the group, guide the decision making of biodiversity managers as to what actions are required and where best to invest limited funds.

DP150102741 Hogan, Dr Conor F; Spiccia, Prof Leone; Barnard, Dr Peter J; Jasieniak, Dr Jacek J

2015	\$160,000.00
2016	\$134,300.00
2017	\$130,000.00
Total	\$424,300.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation La Trobe University

Project Summary

This project aims to create new science which will enable the development of a superior new class of bio-detection technique, suitable for medical diagnostics and other sensing applications. A multi-disciplinary approach will be taken, combining expertise in a number of fields to explore the use of electrical rather than traditional optical means to control energy transfer and luminescence in novel molecular and nanoparticle-based systems. It is expected that these advances will transform bio-analytical science by giving rise to innovative detection techniques which are low-cost, rapid and highly sensitive.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100739 **Lyons, Dr Anthony N; Minichiello, Prof Victor; Barrett, Dr Catherine M; Brown, Dr Graham E; Hinchliff, Dr Sharron; Dow, A/Prof Briony; Root, Ms Josephine M**

2015	\$128,439.00
2016	\$120,700.00
2017	\$72,811.00
Total	\$321,950.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation La Trobe University

Project Summary

This project aims to explore older Australians' knowledge of, and safe sexual practices in regards to, sexually transmitted infections (STIs). STI rates have increased rapidly amongst older age groups in recent years, yet there is a significant research gap concerning older Australians' knowledge of STIs and the preventative sexual practices they engage in. This project is understood to be the only known Australian study considering older people's knowledge and practices in relation to STI prevention. In examining this issue the project aims to contribute towards the development of policy and educational resources for older Australians, and is expected to work towards enabling optimal sexual health for older individuals.

DP150101673 **Pakes, A/Prof Christopher I; Ley, Prof Dr Lothar; McCallum, A/Prof Jeffrey C; Qi, Dr Dongchen**

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation La Trobe University

Project Summary

This project aims to develop the hydrogen-terminated surface of diamond as a new semiconducting platform for carbon-based spintronics. It will build upon recent experimental advances that have shown diamond to possess a two-dimensional (2D) hole-based system with strong spin-orbit coupling. As a semiconductor with unique spin properties, surface conducting diamond offers considerable advantages over other 2D materials such as graphene and topological insulators. These unique properties will be exploited to realise novel semiconductor device architectures for the manipulation of spin using electric fields, and for the study of new spin transport phenomena and quasiparticle excitations at semiconductor-superconductor interfaces.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103313 Perugini, A/Prof Matthew A; Panjikar, Dr Santosh

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation La Trobe University

Project Summary

This project aims to characterise a recently discovered allosteric mechanism called 'Ligand-Induced association by Lysine (K)' (LINK) model. LINK model regulates the function of a key biosynthetic enzyme in bacteria and plants, including agriculturally-important species such as wheat. Also, it represents a highly significant discovery to the field of biochemistry. The expected outcomes of this project include an in-depth understanding of the molecular basis of a new allosteric mechanism for regulating intracellular lysine levels, which in the longer term offers excellent potential to be manipulated for agricultural benefits.

DP150100487 Stern, Dr Nicola; Jacobs, Dr Zenobia; McClusky, Dr Simon ; Williams, Prof Ian S; Murray-Wallace, Prof Colin V; Grun, Prof Dr Rainer; Denham, Dr Timothy P

2015	\$119,898.00
2016	\$119,500.00
2017	\$123,685.00
2018	\$109,260.00
Total	\$472,343.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation La Trobe University

Project Summary

The southern tip of the Mungo lunette is an icon of Australia's Indigenous past. Despite its international significance, the archaeological traces have disintegrated as the lunette has eroded over the past 30 years. In this interdisciplinary project, collaboration with Elders from the Willandra Lakes Region World Heritage Area is expected to reconstruct the history of environmental changes and the life-ways of the first humans to settle this region. The focus will be on stitching together the archaeological traces scattered through space and time, and on measuring processes of modern sediment erosion and deposition so as to develop management strategies for the future protection of this unique archive of Australia's past.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101491 Strugnell, Dr Jan M; Green, Dr Bridget; Murphy, Dr Nicholas P; Bell, A/Prof James J

2015	\$130,000.00
2016	\$115,100.00
2017	\$90,000.00
Total	\$335,100.00

Primary FoR 0704 FISHERIES SCIENCES

Administering Organisation La Trobe University

Project Summary

Continual recruitment of young is fundamental to the replenishment of populations, especially when a stock is fished. Existing theory suggests that species with very long planktonic larval stages disperse widely, ensuring their genes are well mixed. However, recently identified genetic differences between populations of rock lobster challenge this paradigm and demonstrate that despite larvae mixing in the ocean for years, local recruitment and/or adaptation are at play. Recent developments in genomics and bioinformatics should allow this project to understand the ecological processes underpinning these genetic signatures and determine their evolutionary implications. Such findings could direct targeted rebuilding of depleted fisheries stocks.

DP150104639 Truscott, Dr Kaye N; Dougan, Dr David A

2015	\$105,000.00
2016	\$103,600.00
2017	\$112,000.00
Total	\$320,600.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation La Trobe University

Project Summary

Mitochondria are critical for energy transduction and other metabolic processes in eukaryotic cells. The vast majority of proteins that perform these functions are nuclear-encoded and fold and assemble in the mitochondrion after their import. This project aims to determine the interplay between the dynamic and competing processes of protein complex biogenesis and quality control in the assembly of respiratory complex II. The project aims to determine the steps and molecular components of the assembly pathway, uncover the molecular mechanism of the only known flavinylation factor and to establish the impact of proteases on this pathway. The project is significant because an imbalance in mitochondrial protein homeostasis leads to diseases in humans.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102675 Zion, A/Prof Lawrie M; Marjoribanks, Prof Timothy K; Ricketson, Prof Matthew D; O'Donnell, Dr Penelope A; Dodd, Dr Andrew C; Bradley, Mr Kevin J; Dobbie, Mr Michael

2015 \$80,000.00

2016 \$76,700.00

2017 \$80,000.00

Total \$236,700.00

Primary FoR 1903 JOURNALISM AND PROFESSIONAL WRITING

Administering Organisation La Trobe University

Project Summary

This aim of this project is a multifaceted, innovative and timely analysis of the role of mass redundancies, forced career changes and the digital reinvention of Australian journalism at a time of industry restructure and technological change. The nation's journalistic workforce shrank by 15 per cent in 2012 when 1000 journalists were made redundant. This project is intended to explore the transformation of the careers of these journalists and how to best address questions about professional journalism's experience of structural transformation and its capacity to adapt positively to change. The project is expected to provide the first in-depth account of the complex interplay between economic, technological, workplace and career pressures reshaping professional journalism.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Monash University

DP150104292 Anderson, Prof Heather M; Koo, Dr Bonsoo; Seo, Dr Myung H

2015 \$92,000.00

2016 \$85,400.00

2017 \$85,000.00

Total \$262,400.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation Monash University

Project Summary

Forecasts of macroeconomic and financial variables play a crucial role in forward planning undertaken by government and financial institutions, but the predictability of these series is often context and time specific, making standard forecasting techniques unreliable. This project aims to develop new modelling and forecasting techniques that can adapt to structural changes in the model soon after they occur. It aims to derive relevant econometric theory, use simulations to study the properties of the proposed techniques, as well as apply these new techniques to observed data.

DP150101982 Andrews, Dr Zane B; Oldfield, Prof Brian J; Spanswick, Prof David C

2015 \$110,000.00

2016 \$113,200.00

2017 \$150,000.00

2018 \$118,000.00

Total \$491,200.00

Primary FoR 0606 PHYSIOLOGY

Administering Organisation Monash University

Project Summary

This project aims to expand our knowledge about the neural circuits that influence a feeding response in the absence of emotional or cognitive obstacles. Feeding behaviour is a fundamental physiological process in all animals. Despite the seemingly simple endpoint, feeding behaviour is affected by numerous factors including stress and motivation that can inhibit feeding behaviour. This knowledge is critical to maximise growth and survival in many Australian sectors including agriculture, conservation and basic science.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100003 Armstrong, Prof Jean; Sekercioglu, Dr Ahmet Y

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0909 GEOMATIC ENGINEERING

Administering Organisation Monash University

Project Summary

Accurate information about the position of a person or device is essential in many situations. However, despite extensive worldwide research, there is still no positioning system suitable for many important indoor applications. The widespread introduction of energy efficient white light emitting diodes (LEDs) for indoor lighting provides an unprecedented opportunity to solve this problem by using these LEDs to transmit signals from which a receiver can calculate its position. However the theory underlying the design and analysis of position estimation using modulated optical signals does not exist. This project aims to develop this fundamental theoretical basis and apply it to create the accurate indoor positioning systems of the future.

DP150100986 Bellgrove, Prof Mark A; O'Connell, Asst Prof Redmond G

2015	\$110,000.00
2016	\$124,700.00
2017	\$120,000.00
Total	\$354,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Monash University

Project Summary

Effectively distributing attention in space is critical to human learning and performance. Although it is recognised that spatial attention is influenced by arousal states, we lack an understanding of the associated brain mechanisms and dynamics. This project aims to monitor changes in arousal levels (pupillometry) and discrete stages of information processing (EEG) at the millisecond level during a spatial attention task. Establishing the sensitivity of these methods to spontaneous and externally driven fluctuations of arousal is expected to yield a mechanistic account of the neural substrates of spatial attention with implications for human learning and performance, and diagnosis and treatment of attention disorders.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103557 Bouazza, Prof Abdelmalek; Rowe, Prof Ronald K

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation Monash University

Project Summary

Landfill gas represents an opportunity for electricity generation and carbon abatement: it need not be managed solely for environmental, health or safety risk reasons. However, our ability to predict gas collection and fugitive emissions from landfills capped with geosynthetics liners, in consideration of the myriad of factors that control these processes, is imperfect. Building on recent advances in unsaturated soil mechanics, this project aims to conduct cutting-edge experimental and theoretical research to develop an experimentally-validated theory of gas migration through geosynthetics systems that is expected to lead to major improvement in performance and provide integrated design tools which are much needed but not currently available

DP150100558 Bourgeois, A/Prof Laure N; Medhekar, Dr Nikhil

2015	\$126,000.00
2016	\$120,800.00
2017	\$126,000.00
Total	\$372,800.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation Monash University

Project Summary

Solid-state precipitates are key features of the microstructures of many natural and artificial materials and govern their properties. Yet understanding, let alone designing, the microstructures of materials remains a formidable challenge. The recent discovery of a new class of embedded interfaces in aluminium alloys offers the prospect of determining the atomic-scale mechanisms of precipitation. This project aims to apply the latest microscopy and computational techniques synergistically to characterise such interfaces and develop atomic-scale mechanisms of nucleation and growth in model alloy systems. It is expected that this work will constitute a major step towards practical control of solid-state precipitation in technologically important materials.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103715 Boyce, Dr John D; Bulitta, Dr Jurgen B; Seemann, Dr Torsten

2015	\$130,000.00
2016	\$143,900.00
2017	\$180,000.00
Total	\$453,900.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation Monash University

Project Summary

Small RNA (sRNA) molecules are critical regulators of bacterial gene expression. These molecules control important phenotypes in the Gram-negative veterinary pathogen *Pasteurella multocida*. This project aims to identify the range of *P. multocida* sRNAs and to show how expression of these molecules changes under various growth conditions. Specifically, this project endeavours: to identify the mRNA targets of the sRNAs; to identify the mechanisms of sRNA-mRNA interaction; to build systems-biology models that describe the sRNA regulatory circuits; to design inhibitors capable of disrupting critical sRNA-mRNA interactions; and to use the new inhibitors to modulate specific phenotypes. The ability to precisely manipulate sRNA regulatory circuits could allow fine control of bacterial phenotypes and could be widely applicable.

DP150104695 Brown, Prof Rebekah R; Ferguson, Dr Briony; Loorbach, Prof Derk A

2015	\$73,000.00
2016	\$74,800.00
2017	\$78,000.00
Total	\$225,800.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation Monash University

Project Summary

Two kinds of process bring sustainable socio-technical practices into the mainstream: those supporting adoption of alternatives (much studied already), and those facilitating decline of superseded practices (seriously neglected so far). Exposing that second and less visible side of the coin, this research aims to develop a more holistic and balanced theory than current advocacy-based accounts of urban infrastructure change, and insights into the 'interface' between discarding the old and adopting the new. To complement theory, it aims to offer the first empirical study of processes that weaken old paradigms. Outcomes are expected to include a new research agenda and a practitioner toolkit for addressing institutional barriers to sustainability transitions.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101371 Buckle, A/Prof Ashley

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation Monash University

Project Summary

The primary aim of this application is to enhance the thermodynamic and folding properties of proteins by redesign and engineering. The structures and folding behaviour of the redesigned proteins will be characterised using X-ray crystallography and biophysical techniques. The expected outcomes of this project are: engineering of new proteins that can be used in biotechnology, medical and pharmaceutical applications, or basic research; fundamental insights into protein design and engineering; and a wealth of knowledge on the factors that dictate protein stability and folding.

DP150103750 Cheng, A/Prof Wenlong

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Monash University

Project Summary

Soft skin-like electronics can enable applications that are impossible to achieve with today's rigid circuit board technologies. However, it is difficult to realise such future soft electronics with traditional materials and conventional manufacturing methodologies. This project aims to synthesise novel organically-capped copper nanowires as electronic inks (e-inks) for developing cost-effective, soft, stretchable conductor (e-skin) sensors, which are wearable for monitoring blood pulses, body motions and hand gestures in real-time and in situ. This is expected to advance our knowledge in nanotechnology and generate patentable technologies in soft e-skin sensors, and to bring significant scientific and economic gains to Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103636 Connallon, Dr Timothy M

2015	\$92,511.00
2016	\$92,600.00
2017	\$92,721.00
Total	\$277,832.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation Monash University

Project Summary

This project aims to outline a broadly applicable approach for estimating sex-specific selection, which is based on an extension of the theory of local adaptation with gene flow. Adaptive evolution can be constrained when patterns of selection differ between the sexes. Experiments using model organisms provide strong evidence for adaptive constraints due to sex differences in selection. Outside of these model systems, sex-specific selection estimates are difficult to obtain because methods for estimating selection are not easily applied to natural populations. Experiments, using a clinally variable *Drosophila* population from Eastern Australia constitute the first tests of the new theory.

DP150101281 Cook, Dr Perran L; Giud, Prof Ronnie N; Meysman, Prof Filip

2015	\$120,000.00
2016	\$115,100.00
2017	\$104,000.00
Total	\$339,100.00

Primary FoR 0399 OTHER CHEMICAL SCIENCES

Administering Organisation Monash University

Project Summary

The discovery of 'cable bacteria', which can couple redox half reactions centimetres distant from one another by transporting electrons along their filaments, has fundamentally changed the way we view sediment biogeochemistry. This project will investigate the interaction between 'cable bacteria' and enhanced nitrogen recycling in seasonally anoxic estuaries. This project will help improve understanding of how nitrogen is retained in seasonally anoxic estuaries which is essential to combatting the problem of eutrophication. In addition the fundamental new understanding of the ecology and biogeochemical processes mediated by 'cable bacteria', may lead to future applications in waste water treatment.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103820 Currie, Prof Peter D; Heimberg, Dr Alysha

2015	\$111,000.00
2016	\$106,400.00
2017	\$111,000.00
Total	\$328,400.00

Primary FoR 0604 GENETICS

Administering Organisation Monash University

Project Summary

The general aim of this project is to exploit the advantages of the zebrafish system and our access to the embryology of Australian shark species to generate an understanding of the basis for muscle fibre diversity and evolution. While there is some understanding of the fundamental genetic basis of how to make an individual muscle cell from a nascent myoblast there is far less knowledge on how individual muscle cells generate mature muscle types and patterns. The intended outcome of this research is to generate understanding of the complex molecular basis of muscle patterning in the simple paradigm of the zebrafish myotome that could be applied across the vertebrate phylogeny.

DP150101726 Edgington-Mitchell, Dr Daniel M; Honnery, A/Prof Damon R

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

The focus of this research is to further develop understanding of the fundamental mechanics of the aeroacoustic phenomenon known as screech. From this deeper understanding a range of tailored control mechanisms are expected to be developed to reduce or eliminate the effects of screech in the engines of high-speed aircraft. The research builds on existing expertise and established experimental facilities. As well as an improved understanding of fundamental mechanism, the expected outcomes of the research are more efficient active and passive flow control devices for the reduction of supersonic jet noise.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101847 Ellinghaus, Dr Katherine

2015	\$50,000.00
2016	\$48,000.00
2017	\$60,000.00
2018	\$30,000.00
Total	\$188,000.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation Monash University

Project Summary

This project aims to be the first major study of the clauses in Aboriginal Protection Acts that allowed Aborigines to be released from control by the government; these are also known as exemption policies. By examining rich and underutilised government archives, it aims to provide a nuanced account of how Aboriginal people negotiated the pressures and possibilities of assimilation from 1897 to 1967. At the same time, it aims to reveal how non-Aboriginal Australians imagined Aborigines becoming equal citizens. More generally, this study is expected to advance scholarly knowledge of the intricate workings and development of assimilation policy and enable a new reckoning of the legacy and practice of assimilation.

DP150104483 Etheridge, Prof Joanne

2015	\$135,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$120,000.00
Total	\$490,100.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation Monash University

Project Summary

Atomic structures are determined by measuring how they scatter radiation. However half of the necessary information, the crystallographic phase, cannot be measured from the scattered intensity. For a century the only option has been to deduce the phase via the statistical analysis of thousands of intensity measurements. This project aims to develop a method to determine atomic structures from the direct observation of phase. From a handful of observations and no formal measurements, atoms can be located with picometre precision. It is predicted that this method will be direct, rapid and unequivocal, sensitive to light atoms and applicable to nanostructures, which will represent a paradigm shift in crystallography.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103131 Flynn, A/Prof Bernard L; Krenske, Dr Elizabeth H

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

This project aims to integrate theory and experiment to design new catalysts for the synthesis of multi-stereocentre-containing molecules. Such molecules offer clear advantages in the area of drug design, owing to their potent and selective binding to biological targets, but a lack of available methods for their preparation currently limits their widespread use. This project will use theory to guide the discovery of new ways to make these molecules. It is expected that detailed understanding of the factors that control stereocentre formation will be obtained from accurate theoretical modelling and will be applied to invent new catalysts that deliver improved performance and control over product structure.

DP150102240 Fouras, A/Prof Andreas; Sheard, A/Prof Gregory J; Thompson, Prof Bruce R

2015	\$113,000.00
2016	\$108,400.00
2017	\$113,000.00
Total	\$334,400.00

Primary FoR 0903 BIOMEDICAL ENGINEERING

Administering Organisation Monash University

Project Summary

Our lungs are essential to sustain our lives, yet the details of lung biomechanics are barely understood because the available tools, imaging, modelling and simulation have significant limitations. Imaging is largely limited to providing structural information; simulation is severely restricted by a lack of validation; and inverse modelling is critically hampered by a lack of spatially resolved inputs. The project's multidisciplinary team is uniquely positioned to explore these problems through the hybridisation of world-leading functional lung imaging technology with state-of-the-art modelling. This project aims to provide, perhaps for the first time, the capacity to see details with the resolution of imaging, richness of modelling and reliability of the finest measurements.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103837 Fuhrer, Prof Michael S; Adam, Asst Prof Shaffique

2015	\$210,000.00
2016	\$134,300.00
2017	\$140,000.00
2018	\$130,000.00
2019	\$130,000.00
Total	\$744,300.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation Monash University

Project Summary

The project will prepare novel semiconductor materials based on layered transition metal dichalcogenides in which electrons are confined in atomically-thin planes. This strong confinement leads to new properties that will be studied in this project, including strong electron-electron interactions, strong electron-defect interactions and atomically-sharp heterostructures. Additionally the novel electronic structure of the dichalcogenides leads to new electronically and optically addressable information storage and transmission based on the 'valley' of the electrons. It is expected that these new properties will enable photovoltaics, quantum-confined devices operating at room temperature, and new information processing based on the valley degree of freedom.

DP150101012 Gao, Prof Jiti; Phillips, Prof Peter C

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
2018	\$30,000.00
2019	\$30,000.00
Total	\$296,700.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation Monash University

Project Summary

This project proposes to tackle several very important and difficult issues in modelling general climatological, economic and financial panel data that involve possible trending components. This project seeks to establish some general asymptotic theory for model estimation and specification technologies that are suited to such general nonlinear panel data that may be stochastically non-stationary and endogenous. The research outcomes of this project are expected to be applicable in evaluating and improving empirical model building and forecasting from better models in climatology, economics and finance with possible endogeneity and nonlinearity and non-stationarity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

**DP150104369 Gray, A/Prof Kylie M; Tonge, Em/Prof Bruce J; Einfeld, Prof Stewart L; Howlin, Em/Prof Patricia;
Stancliffe, Prof Roger J**

2015 \$84,000.00

2016 \$115,100.00

2017 \$97,000.00

Total \$296,100.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Monash University

Project Summary

It is recognised that autism results in substantial life-long disability. Severe emotional and behavioural problems are likely to be a key factor in precluding adults with autism from work, independent living, social contact, and undermine their quality of life, thus increasing support needs. This project aims to address a major gap in our current knowledge - the association between severe emotional and behavioural problems in adults with autism and social outcomes.

Identification of markers of adult outcomes aims to lead to an improved understanding of the pathways to better social outcomes, facilitating the development of specific interventions to provide much needed improvements in outcomes for adults with autism.

DP150100242 Handfield, A/Prof Toby; Berg, A/Prof Nathan

2015 \$54,000.00

2016 \$47,000.00

2017 \$53,000.00

Total \$154,000.00

Primary FoR 2203 PHILOSOPHY

Administering Organisation Monash University

Project Summary

The saying "Nice guys finish last" captures the thought that moral cognition makes us vulnerable to exploitation. This project aims to examine this hypothesis by investigating three aspects of moral cognition that might lead us to form false beliefs or render us vulnerable to manipulation by others: our beliefs about punishment; our tendency to identify with groups; and our willingness to trust others. The project is designed to involve empirical investigation of the circumstances in which moral behaviour can have harmful side-effects; it also entails theoretical analysis intended to improve our ability to construct robust theories of cooperative and punitive behaviour.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100119 Hapgood, Prof Karen P; Ghadiri, Prof Mojtaba

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$80,000.00
Total	\$375,900.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation Monash University

Project Summary

Granule breakage of micro-structured specialty products impedes manufacturing and degrades product performance. Predictive breakage models have had limited success as each granule has a unique structure. Differences between the model predictions and experimental breakage test results could be due to inaccurate models or irreproducible experimental results due to granule structure differences. This project is expected to be the first ever application of three-dimensional printing for reproducible breakage testing. The project aims to: create the first ever multiple identical copies of complex granules using polyjet three-dimensional printing; model and experimentally measure granule breakage; and develop sophisticated Digital Elevation Models of granule breakage for practical use in industry.

DP150102033 Hope, A/Prof Colin A; Bowen, Dr Gillian E; Gardner, Prof Iain

2015	\$141,637.00
2016	\$140,000.00
2017	\$146,713.00
2018	\$56,616.00
2019	\$56,616.00
Total	\$541,582.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation Monash University

Project Summary

This project aims to examine the growth and survival of the cult of Seth in Egypt's Western Desert against the background of the cult's suggested proscription elsewhere in the ancient state. Through detailed excavation and radiometric dating of the cult centre in Dakhleh Oasis, it aims to explore the proposition that the continued veneration of Seth can be read as a sign of regional independence. This is intended to challenge the orthodox view that Egypt operated as a monolithic state; reshaping how we approach ancient Egyptian religion and administration. In doing so, the study is expected to position an Australian research team at the forefront of contemporary scholarship on Egypt, enhancing our national reputation in the promotion and preservation of global heritage.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102879 Hourigan, Prof Kerry; Thompson, Prof Mark C; Sheridan, Prof John; Leweke, Dr Thomas; Lo Jacono, Dr David

2015	\$215,000.00
2016	\$190,400.00
2017	\$208,000.00
Total	\$613,400.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

Flow-induced vibrations of bluff bodies can lead to severe damage in many applications, such as off-shore marine structures and tethered bodies. Rotation of bluff bodies can result in huge increases in lift forces, which may promote these vibrations, whereas a nearby free surface may stabilise the vibrations. This project aims to discover the mechanisms underpinning the apparently opposing effects of vibration and free surface, individually and jointly, and the excitation of two- and three-dimensional instabilities in the wakes of two generic bluff bodies: the cylinder and the sphere. The expected outcomes are the discovery of new modes of body vibration, wake transitions and means to control fluid-structure interactions.

DP150101577 Hutchinson, A/Prof Christopher R; Barnett, Prof Matthew R; Deschamps, Prof Alexis

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
2018	\$105,000.00
Total	\$415,700.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation Monash University

Project Summary

Ninety per cent of failures of metal components are caused by fatigue. Fatigue arises from cycles of alternating stress during service which lead to failure at stress levels surprisingly short of the material's static strength. Fatigue is the 'Achilles heel' of complex engineering alloys and places significant limitations on adopting new lightweight solutions for improvements to fuel efficiency in transportation. Aluminium alloys in particular have notoriously poor fatigue performance. This project aims to develop a new class of fatigue resistant light alloys whose properties improve, rather than deteriorate, during service. This development is based on a new understanding of the coupling of microstructure evolution and deformation.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101878 Jones, Prof Cameron; Aldridge, Prof Simon

2015	\$160,000.00
2016	\$153,400.00
2017	\$150,000.00
2018	\$150,000.00
Total	\$613,400.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

In this project, innovative approaches will be employed to access new, and fundamentally important, classes of low oxidation state main group compounds, the electronic properties and reactivity of which will be readily tuned to mimic those of noble transition metal complexes. The project aims to harness these attributes, for the first time, to establish such compounds as cheap and sustainable alternatives to the expensive and toxic transition metal catalysts that are currently essential to numerous synthetic processes utilised in academia and industry. The involvement of a synergistic international network of collaborators will be central to the success of this project, which offers major academic, environmental and economic benefits to Australia.

DP150103588 Klebaner, Prof Fima C; Hamza, A/Prof Kais; Jagers, Prof Peter; Barbour, Prof Andrew D

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0104 STATISTICS

Administering Organisation Monash University

Project Summary

The project aims to develop new mathematical models and tools for the rigorous analysis of very general stochastic populations that are subject to internal competition and feedback. The proposed mathematical framework is that of measure-valued processes, a setting needed to encompass the complexity and random structure inherent in such systems. Models of this kind have real-world applications in evolutionary biology, cell kinetics and cancer research, and are essential to our understanding of the persistence of endemic disease and of the preservation of endangered species. The results of this project are expected to provide insight into the behaviour and (in-)stabilities of complex stochastic populations, and offer guidance for their management.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100894 Konagurthu, Dr Arun S; Stuckey, Prof Peter J; Garcia de la Banda, Prof Maria J; Lesk, Prof Arthur M

2015	\$98,000.00
2016	\$97,800.00
2017	\$106,000.00
Total	\$301,800.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation Monash University

Project Summary

Progress in protein structural biology relies heavily on key computational technologies, structural alignment being an indispensable one. Despite its importance the structural alignment problem has not been formulated, much less solved, in a consistent and reliable way. This project aims to rectify this by combining novel information-theoretic inference with advances in constraint optimisation and visualisation. State-of-the-art alignment methods aim to be produced for biologists to generate statistically-rigorous and biologically-trustworthy alignments, and allow them to visualise structural relationships in unprecedented ways. This project is expected to provide direct payoffs to the fields of protein science, crystallography and bioinformatics.

DP150101522 Lupton, Dr David W

2015	\$125,000.00
2016	\$123,700.00
2017	\$129,000.00
2018	\$60,000.00
Total	\$437,700.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation Monash University

Project Summary

Catalytic reactions can enhance the efficiency of chemical synthesis, decreasing environmental and financial cost. This project will undertake the discovery and development of reactions in which a catalyst enables a "production line" of events to provide complex and valuable products. These reactions will proceed with high shape selectivity (enantioselectivity). In addition to new chemical transformations the output of these studies includes intellectual capital and human resources, all of which are integral to sustaining a strong chemical manufacturing sector.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104670 Lyras, A/Prof Dena; Riley, Prof Thomas V; Clements, Prof Archie C; Carter, Dr Glen P

2015	\$135,000.00
2016	\$134,300.00
2017	\$146,000.00
Total	\$415,300.00

Primary FoR 0702 ANIMAL PRODUCTION

Administering Organisation Monash University

Project Summary

The Australian pig industry produces pork commodities from over 4.75 million pigs per year. Infectious diseases in industrial-scale piggeries can have a devastating effect on pork production, particularly on feed conversion efficiency and growth rates, and can pose downstream environmental contamination and food safety risks. This project aims to assess a current infectious disease problem in pigs by studying a microbe that appears to have uniquely evolved in Australia. These results could inform the rational design of monitoring, prevention and treatment strategies to minimise infection outbreaks in Australian pigs and may result in production benefits to the pork industry, reduced environmental microbial contamination and safer food.

DP150100061 Madsen, Prof Jakob B; Raschky, Dr Paul A; Hodler, Prof Roland

2015	\$120,000.00
2016	\$114,100.00
2017	\$125,000.00
2018	\$125,000.00
2019	\$125,000.00
Total	\$609,100.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation Monash University

Project Summary

Using national and regional data for 30 to 50 countries over multiple centuries, this project will examine the effects of itemised government expenditure and revenue on productivity, investment, saving, labour force participation and research and development. The results are expected to shed light on the macroeconomic effects of different revenue and spending categories (education, transfers, and so on). In addition, the project aims to determine which factors have been responsible for the increase of government size over the past two centuries. The results aim to further reveal which government revenue and expenditure items are most conducive to economic welfare and growth.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101728 Martin, Prof Gael M; Forbes, A/Prof Catherine S; McCabe, Prof Brendan; Robert, Prof Christian P

2015	\$86,000.00
2016	\$93,000.00
2017	\$98,000.00
Total	\$277,000.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation Monash University

Project Summary

Economic and financial data frequently exhibit dynamic patterns, driven by unobserved processes that relate to the behaviour of economic agents, or to institutional and technological change. To gain insight into such 'latent' processes is of paramount importance in terms of both understanding the economy and producing accurate, readily up-dated, forecasts of its future performance. Using a Bayesian approach, new simulation-based statistical methods for analysing latent variable models are proposed. Emphasis is given to the development of relatively simple techniques that are applicable to a wide range of empirically relevant models, with a view to improving the access of non-specialists to this powerful form of statistical analysis.

DP150103017 McGeoch, A/Prof Melodie A; Hui, Prof Cang

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$100,000.00
Total	\$395,900.00

Primary FoR 0602 ECOLOGY

Administering Organisation Monash University

Project Summary

Australian native and agricultural landscapes are under threat from introduced plant species. Over \$1.5 billion per year is spent on subsequent land management. However it is not clear that this is money is well spent. This project aims to determine the importance of the two major factors (dispersal and habitat) that drive the invasion of Australian native plant communities by surveying native Australian plant communities with different levels of disturbance and numbers of introduced species. The results could enable the building and testing of an innovative model for predicting the establishment and spread of invasive species. This critical research could help target money towards better management of invasive species in native environments.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101911 McNevin, Dr Anne; Missbach, Dr Antje; Mulyana, Prof Deddy

2015	\$94,539.00
2016	\$70,100.00
2017	\$40,097.00
Total	\$204,736.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation Monash University

Project Summary

This project examines emerging bilateral strategies in border control that are based on public communication. It focuses specifically on public information campaigns conducted in Indonesia in which religious messaging (Islamic and Christian) is used to discourage Indonesian communities from assisting people-smugglers and asylum seekers en route to Australia. The impact and broader implications of these campaigns for regional migration governance will be investigated through qualitative methods. The project aims to provide an account of governance at the intersection of political and religious arenas with significance for border control in the Asia-Pacific and for an advanced understanding of regional governance processes.

DP150104362 Morgan, Dr Luke A

2015	\$31,770.00
2016	\$41,300.00
2017	\$41,331.00
Total	\$114,401.00

Primary FoR 1201 ARCHITECTURE

Administering Organisation Monash University

Project Summary

This project aims to significantly expand and augment prevailing historical concepts of landscape design. It will be the first to examine early modern gardens in terms of contemporary experience. The written responses of contemporary visitors to Elizabethan and Jacobean gardens will be compared with literary motifs of the time. Research will explore the proposition that gardens were complex cultural constructions capable of eliciting a wide range of responses.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101477 O'Connor, Prof Justin; Webb, Prof Jennifer L; Brook, Asst Prof Scott; Shan, Prof Shilian

2015	\$95,335.00
2016	\$119,900.00
2017	\$131,294.00
Total	\$346,529.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation Monash University

Project Summary

The research seeks to understand how graduates of creative arts programs in Australia and China build creative vocations. It investigates the motivations for and rewards of unpaid cultural work across three areas of graduate work (visual arts, creative writing and performance) in two United Nations-recognised Creative Cities: Melbourne and Shanghai. Such research is of high significance for curriculum developers, as studies show that employment outcomes for creative arts graduates remain very poor, despite a growing cultural economy. The project is expected to lead to a theoretically innovative, evidence-based and globally transferable account of the practical economy of arts work, one that can assist creative arts programs to better prepare students.

DP150102982 Palmer, Dr Daniel; Jolly, Dr Martyn T

2015	\$76,600.00
2016	\$63,500.00
2017	\$37,325.00
Total	\$177,425.00

Primary FoR 1901 ART THEORY AND CRITICISM

Administering Organisation Monash University

Project Summary

This project aims to develop new curatorial models to enable Australian art galleries to respond effectively to changes in the medium of photography wrought by digital technologies. By conducting the first comprehensive analysis of nearly five decades of Australian photography curating and comparing it to curatorial approaches in related institutions locally and internationally, the project seeks to: identify the crucial role of photography exhibitions in the shaping of Australian visual culture; and develop opportunities for curators to better engage with the current proliferation of images, including new forms and practices of photography enabled by the Internet.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102168 Parker, Prof Christine E; Scrinis, Dr Gyorgy

2015	\$120,000.00
2016	\$143,900.00
2017	\$120,000.00
Total	\$383,900.00

Primary FoR 1801 LAW

Administering Organisation Monash University

Project Summary

The food label has become an important site of contestation and controversy with respect to a range of health, safety, environmental and ethical issues across the food system. This project aims to examine the regulation of food labelling in Australia through a focus on free range labelled eggs and animal products. It aims to shed light on the dynamics of how a network of food producers, retailers, private certification organisations and regulatory agencies are responding to changing demands for ethical and quality foods. The project is expected to develop new strategies for a more effective, legitimate and stakeholder-inclusive approach to regulating food labels.

DP150103595 Peters, Dr Anne-Marie; Verhulst, Prof Dr Simon

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0602 ECOLOGY

Administering Organisation Monash University

Project Summary

Immune defences are vital for resistance against infections, but are an overlooked component of disease dynamics in the wild. The project aims to use a model system of long-term studied wild birds to investigate causes of individual variation in innate immunity, the critical first-line-of-defence against new infections. The results may show how immune dynamics are linked to disease, aging, reproduction and longevity and to what extent this is environmentally-determined or inherited (its adaptive potential). The outcomes could provide broadly generalizable insights into interactions between the immune system and the environment, and may identify risk factors for vulnerability to novel infectious diseases.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102587 Porter, Prof Chris J; Scanlon, A/Prof Martin J; Bennett, Prof Nigel W; Halls, Dr Michelle L

2015	\$170,000.00
2016	\$163,000.00
2017	\$170,000.00
2018	\$30,000.00
2019	\$30,000.00
Total	\$563,000.00

Primary FoR 1115 PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

Administering Organisation Monash University

Project Summary

The success of drug treatment depends critically on specificity, i.e., stimulation of a therapeutic response at a target site, and avoidance of activity at other (potentially toxic) locations. This project aims to explore how drug interactions with binding proteins in the cytosol can induce nuclear transport and tissue specific activation of nuclear receptors - a major drug target. The project intends to employ molecular, structural and cell biology approaches to map drug-binding protein-receptor interactions and to determine how the structure of these complexes dictates receptor activation. The data could provide a roadmap to design drugs that interact with the right protein in the right tissue and in doing so dramatically enhance drug specificity.

DP150104503 Rossjohn, Prof Jamie; Purcell, Prof Anthony W

2015	\$139,000.00
2016	\$137,100.00
2017	\$146,000.00
Total	\$422,100.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation Monash University

Project Summary

Using proteomics, structural biology and cellular immunology, this project aims to provide a greater understanding of the impact of PTMs on the immune system. The immune system combats pathogens by mounting T-cell responses against foreign antigens present in infected cells. However, T-cells activated by self-antigens that are inadvertently presented by healthy cells can cause aberrant T-cell reactivity and disease. Post-translational modifications (PTMs) are common in the host's proteins, but surprisingly little is known about their effect on T-cell immunity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101058 Selomulya, A/Prof Cordelia; Plebanski, Prof Magdalena

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation Monash University

Project Summary

This research promises new classes of immune-imprinting, biodegradable nanoparticles (iNPs) with anti-inflammatory properties. The engineering of such particles requires fundamental understanding of their properties that enable specific cellular interactions to regulate immunity with new anti-inflammatory pathways. For pulmonary delivery, spray-dried amino acid microspheres with tailored surfaces as carriers can be generated using the innovative microfluidic drying approach. The potential applications of iNPs are wide-ranging and are not restricted to pulmonary targeting. The potential commercial implications for Australia's emerging biopharmaceutical industry are substantial.

DP150102920 Sheard, A/Prof Gregory J

2015	\$140,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$375,100.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation Monash University

Project Summary

The question as to whether lateral variation in global ocean buoyancy resulting from low solar radiation near the poles and higher temperatures in the tropical regions (known as horizontal convection) is a driver for global ocean currents is critical to our understanding of this complex and delicate system that maintains Earth's temperate climate. This question hinges on the relationship between heat transport and strength of buoyancy forcing towards global scales; this project proposes a landmark experimental effort supported by detailed simulations to probe the ultimate regime of heat transport in horizontal convection. The project is expected to inform the direction of future ocean and climate modelling efforts to the benefit of humanity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102894 Siems, A/Prof Steven T; Belusic, Dr Danijel; Manton, Prof Michael J; Sullivan, A/Prof Peter P; Keywood, Dr Melita D; Schulz, Dr Eric W

2015	\$160,000.00
2016	\$134,300.00
2017	\$110,000.00
Total	\$404,300.00

Primary FoR 0401 ATMOSPHERIC SCIENCES

Administering Organisation Monash University

Project Summary

Both satellite products and climate models have large biases in the energy and water budgets over the Southern Ocean (SO). This is a direct consequence of a poor understanding of the structure and dynamics of the SO atmospheric boundary layer, which has arisen from an inability to make the necessary observations in this harsh environment. Due to the availability of new Australian research infrastructure, large steps forward are now possible with modest investment. This project will conduct and combine observations from the recently acquired marine vessel, RV Investigator, and the collocated airborne and surface observations to understand the structure and evolution of the unique, pristine SO boundary layer and to evaluate satellites and climate models.

DP150100210 Silvapulle, Prof Mervyn J; La Vecchia, Dr Davide A; Hallin, Prof Marc

2015	\$69,000.00
2016	\$64,300.00
2017	\$70,000.00
Total	\$203,300.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation Monash University

Project Summary

What is the variability of the exchange rate of the Euro to the Australian dollar? Can the use of the electrocardiogram of a patient be improved as a diagnostic tool for heart disease? A well-known limitation of the existing statistical methods for answering these types of questions is that a small proportion of extreme observations have the potential to lead to results that are more in agreement with the outliers than with bulk of the data. As a consequence, the statistical analyses may lead to wrong conclusions. This project aims to develop new methodologies to solve this problem for a large class of studies. Applications to stock market risk, exchange rate, and diagnosis of heart diseases will illustrate the new methods.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103575 Smith, A/Prof Benjamin; Bauman, Prof Adrian; Rissel, Prof Chris; Shilton, A/Prof Trevor R

2015	\$67,928.00
2016	\$49,300.00
2017	\$30,152.00
Total	\$147,380.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Monash University

Project Summary

Effective disease prevention and health promotion to address the public health challenges facing Australia requires a strong evidence base for policy and practice. Evaluation of programs in natural contexts is a vital source of this evidence, valuable for improving strategy design and delivery, building sustainability and guiding funding. The aim of this project is to determine the strengths and limitations of evaluation by health promotion agencies, and to identify the roles of individual, organisational and system-level factors in relation to evaluation practice and use. This knowledge is expected to guide efforts to build capacity for evaluation, improve systems for organisational learning, and enable evidence gathering to improve effectiveness.

DP150100285 Steinfeld, Dr Ron; Stehle, Prof Damien N

2015	\$86,000.00
2016	\$112,200.00
2017	\$64,000.00
Total	\$262,200.00

Primary FoR 0804 DATA FORMAT

Administering Organisation Monash University

Project Summary

Online services for collaborative communication and software distribution are commonplace today, but their use is hampered by data privacy breaches and intellectual property violations via software reverse engineering. Recent theoretical breakthroughs in cryptography promise to provide new powerful tools for solving these problems, but these tools are not yet suitable for practical use, due to their low efficiency and a lack of solid security foundations. This project aims to apply algebraic and probabilistic techniques to improve efficiency of existing tools, and the understanding of their security. Outcomes are expected to include new insights in cryptographic theory, and new practical tools for cyber security.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100765 Wang, Prof Huanting

2015	\$120,000.00
2016	\$95,900.00
2017	\$100,000.00
2018	\$90,000.00
Total	\$405,900.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation Monash University

Project Summary

A polymer solution-based integration technique is proposed to be developed to fabricate polymer electrolyte membrane fuel cells, allowing for effective engineering of the porous networks and interfaces within electrodes and cells. This novel systems materials engineering approach is expected to overcome the drawbacks of the conventional hot pressing method, enabling precise integration of nanostructured electrodes and membrane into high-performance, flexible fuel cells. The outcomes of this research aim to provide a unique opportunity for Australia to become a world leader in the rapidly-emerging clean energy technology, and critical manufacturing of new energy generation systems for domestic uses and exports, thereby producing important economic benefits.

DP150100506 Wanless, Prof Ian M; Bryant, Prof Darryn E; Horsley, Dr Daniel J

2015	\$80,000.00
2016	\$86,300.00
2017	\$90,000.00
2018	\$90,000.00
2019	\$90,000.00
Total	\$436,300.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation Monash University

Project Summary

The theory of matching in graphs concerns the problem of pairing up objects, subject to constraints on which objects may be paired. It is a well-developed theory that is not only of tremendous mathematical importance, but is also widely applied to efficiently deal with allocation and scheduling problems. Much less is known, however, about the equally important but harder problem of dividing objects into collections of three or more. This project aims to address this deficiency by developing the theory of matching in important combinatorial objects. The problems it expects to solve are of great significance in their own right, and when considered together may help to lay a foundation for a more general theory of matching.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101448 Wilhelm, A/Prof Dagmar; Kumar, Prof Sharad

2015	\$143,000.00
2016	\$179,300.00
2017	\$193,000.00
Total	\$515,300.00

Primary FoR 0604 GENETICS

Administering Organisation Monash University

Project Summary

Deciphering the multi-layered regulation of cell fate decisions is challenging. While progress has been made in understanding the role of transcriptional regulation, the influence of post-translational modification is poorly understood. Neural precursor cell expressed developmentally down-regulated protein 4 (NEDD4)-mediated ubiquitination is absolute necessary for sex determination, a unique model of cell fate decision where gonadal cell precursors differentiate either along the male or the female pathway. Thus, this project aims to analyse in detail at which stage NEDD4 action is required and what are the crucial target proteins. This project could provide a deeper understanding of how post-translational modifications influence cell fate decisions during embryogenesis.

DP150100442 Zhao, Prof Xiao-Ling; Heidarpour, Dr Amin; Al-Mahaidi, Prof Riadh; Han, Prof Lin-Hai

2015	\$100,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$100,000.00
Total	\$415,500.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation Monash University

Project Summary

Ultra-high strength (UHS) steel tubes are currently used mainly in the vehicle industry due to their high strength and light weight. This project aims to enable the building of more resilient and sustainable infrastructure by utilising these UHS steel tubes in double-skin composite tubular construction. To date there has been little work to understand the effects of fire, earthquake and impact related incidents on these structures. This project aims to access unique testing facilities for full size impact and fire testing and the state-of-the-art hybrid testing simulation. It is expected to increase the competitiveness of the Australian manufacturing industry by overcoming the bottleneck in the manufacture of steel sections.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

RMIT University

DP150103990 Adams, Prof David J; Craik, Prof David J; Hung, Dr Andrew; Kaas, Dr Quentin; Luo, Prof Sulan

2015	\$140,000.00
2016	\$139,100.00
2017	\$150,000.00
2018	\$155,000.00
2019	\$50,000.00
Total	\$634,100.00

Primary FoR 0304 MEDICINAL AND BIOMOLECULAR CHEMISTRY

Administering Organisation RMIT University

Project Summary

Nicotinic receptors are intrinsic membrane proteins that play a role in communication in excitable cells, particularly in the nervous system. The primary goals of this project are to define the structural and functional determinants of nicotinic-conotoxin interactions at a molecular level, and develop new selective probes that advance neurophysiological research. The diversity and distribution of nicotinic receptor subtypes being uncovered through molecular biology and selective conotoxin probes presents an exciting opportunity for the discovery of new therapeutic agents.

DP150103135 Amati, Dr Marco; Livesley, Dr Stephen J; Brack, A/Prof Christopher L

2015	\$208,426.00
2016	\$30,000.00
2017	\$35,900.00
Total	\$274,326.00

Primary FoR 1205 URBAN AND REGIONAL PLANNING

Administering Organisation RMIT University

Project Summary

Urban forests provide a range of ecosystem services including temperature regulation and rainfall capture, but measuring these benefits is currently prohibitively costly and inaccurate. This project aims to develop a new model of urban forest ecosystem services that uses remotely sensed three dimensional data to map canopy cover. A model using this data, which is being collected by an increasing number of governments, represents a novel advance on the established methodology that requires expensive and time-consuming fieldwork. The advancements expected to be made in this project will mean that environmental planners will be able to better plan the urban forest so that cities are more liveable and resilient in the face of climate change.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100149 Bouguettaya, Prof Athman; Wang, A/Prof Yan; Bertino, Prof Elisa

2015	\$92,000.00
2016	\$91,100.00
2017	\$97,000.00
Total	\$280,100.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation RMIT University

Project Summary

This project aims at providing a uniform and efficient framework for bootstrapping, establishing, and propagating reputation in composed Web services. Reputation is used as a key criterion for establishing trust among composed Web services. Web services are de-facto the technology of choice for the deployment of an increasing number of Web-based solutions for such emerging applications as cloud computing. Because of the distributed and decentralised nature of the Web, there is a need to establish a trust framework for selecting and composing Web services. The key parameter will be based on Web service reputation in delivering services.

DP150103122 Gordon, Dr Ascelin; Bekessy, A/Prof Sarah A; Moilanen, Prof Atte

2015	\$119,000.00
2016	\$111,200.00
2017	\$114,000.00
Total	\$344,200.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Administering Organisation RMIT University

Project Summary

A fundamental challenge for environmental policies is the different timescales over which ecological and financial costs and benefits occur. For example, whilst revegetation to offset land clearing incurs immediate costs, it can take decades for it to become suitable habitat for wildlife. These long time lags can lead to inefficiencies in spending and poor environmental outcomes. This project aims to develop novel approaches for evaluating the future impacts of environmental policies and new methods for improving their design. It is intended that the methods be tested and demonstrated in the policy context of biodiversity offsetting, which is set to play a key role in nature conservation globally.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100299 Hillier, Prof Dr Jean S; Steele, A/Prof Wendy E; MacCallum, Dr Susan D; Byrne, Dr Jason A; Houston, Dr Donna M

2015	\$55,000.00
2016	\$57,500.00
2017	\$60,000.00
Total	\$172,500.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation RMIT University

Project Summary

Climate variability and change is likely to be felt most acutely at the local scale in Australia. This is where inter/national and State policies are translated into practices to prepare for, and adapt to, anticipated impacts of heatwaves, bushfires and floods. This project will investigate tensions and potentialities between risk-based assessments by local governance agencies and innovations by local groups and Non-Government Organisations. The research will utilise an innovative mixed-methods approach to investigate and to analyse the strategies and experiments of adaptation practices. It aims to develop new ways of identifying and implementing practical, local, adaptive responses that are contextually relevant, socially innovative and capacity building.

DP150104719 Ma, Prof Qian; Xu, Dr Wei; Brandt, Prof Milan; Liu, Prof Zi-Kui

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation RMIT University

Project Summary

This project represents a potential milestone in the development of three-dimensional printing of titanium alloys by selective laser melting. The purpose of this project is to develop essential fundamental knowledge and novel processing routes for three-dimensional printing of titanium alloys to ensure the achievement of better than forged mechanical properties for critical applications. The outcomes of the project are expected to enable access to new markets and supply chains, improve Australia's competitively advantage and national research strength in this critical sector of manufacturing, and enhance the long-term viability of Australia's resources and manufacturing industries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102818 McShane, Dr Ian G; Gregory, Dr Mark A; Goorha, Dr Prateek; Middleton, Prof Catherine A

2015	\$95,788.00
2016	\$90,700.00
2017	\$103,227.00
Total	\$289,715.00

Primary FoR 1605 POLICY AND ADMINISTRATION

Administering Organisation RMIT University

Project Summary

This research positions publicly provided Wi-Fi as a type of urban and civic infrastructure and asks whether there is a sound case for public investment in public Wi-Fi by local governments. Australia lags behind much of the world in providing public wireless internet access, but a surge of investment is closing the gap. This field-based research aims to appraise rationales for public Wi-Fi provision by examining the social, economic and civic impacts of network use. This project aims to fill major empirical and knowledge gaps about investment rationales, uses, and impacts of public Wi-Fi networks, and inform development of urban and communications policies.

DP150101336 Mitchell, Prof Arnan D; Nguyen, Dr Thach G

2015	\$30,000.00
2016	\$86,300.00
2017	\$90,000.00
2018	\$90,000.00
Total	\$296,300.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation RMIT University

Project Summary

Silicon photonics is emerging as a billion dollar global technology industry and waveguide resonators are among the most crucial building blocks for silicon photonic systems. This project aims to introduce an entirely new class of optical waveguide resonator based on recently discovered unusual coupling behaviour in silicon photonics. The science underpinning this new effect will be investigated and experimentally verified and the myriad opportunities for novel device concepts will be explored. The compact resonant structures resulting from this project are expected to offer unprecedented filtering functionality while remaining compatible with silicon photonic mass manufacture, ensuring they can be easily utilised by the broader community.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104327 Moss, Prof David J; Monat, A/Prof Christelle; Ben-Bakir, Dr Badhise

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
2018	\$150,000.00
2019	\$150,000.00
Total	\$743,900.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation RMIT University

Project Summary

Bandwidth and energy demands of telecommunications networks are rapidly reaching a crisis point technologically, economically and from a sustainability viewpoint. At the same time, on-chip interconnects for silicon integrated circuits are also reaching a bottleneck. This project aims to combine the expertise of eight leading international groups to pioneer nonlinear photonic integrated circuits compatible with silicon technology (Complementary Metal Oxide Semiconductor technology, or CMOS) to achieve new capabilities on a chip for signal generation, processing and measurement for telecommunications, computers, and fundamental science. These platforms are expected to allow the integration of electronics with photonics and to be faster, cheaper, smaller, and more energy efficient than current technology.

DP150102472 Stone, Prof Lewi; Dowe, A/Prof David L; Gordon, Dr Ascelin; Wang, Dr Yan; Solow, A/Prof Andrew; Dorazio, Dr Robert

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Administering Organisation RMIT University

Project Summary

Identifying how species are distributed over the landscape, interact and self-organise into foodwebs are central goals in Ecology. This project aims to provide innovative new Bayesian modelling tools to improve our understanding of species distributions and their foodweb networks. It is expected to develop a general framework for extending species distribution models to deal with multiple species, incorporating both their interactions as well as errors in detection. The project also hopes to develop a robust Bayesian methodology for partitioning complex foodweb networks into ecologically relevant compartments as there are currently no reliable methods to achieve this. Both projects are of relevance to conservation policy and management of threatened species.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101894 Wang, Prof Chun H; Veidt, A/Prof Martin; Chiu, Prof Wing K; Rose, Dr Francis; Sohn, Prof Dr Hoon

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0913 MECHANICAL ENGINEERING

Administering Organisation RMIT University

Project Summary

To address the significant limitation of existing non-destructive evaluation techniques in detecting and characterising early damage, this project aims to discover the physical nature of self-generated nonlinear waves by structural damage and to explore its potential for an entirely new class of non-destructive evaluation and structural health monitoring techniques. Major applications are expected to include a baseline-free structural health monitoring technique capable of detecting and quantifying barely-visible impact damage in advanced composite materials, non-destructive evaluation of structures made by additive manufacturing, and detection of hard-to-inspect locations in unitised structures.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Swinburne University of Technology

DP150101734 Catinella, Dr Barbara; Cortese, Dr Luca; Dave, Prof Romeel S; Saintonge, Dr Amelie

2015 \$110,000.00

2016 \$105,500.00

2017 \$110,000.00

Total \$325,500.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation Swinburne University of Technology

Project Summary

The observed properties of galaxies are known to depend on their surrounding local environment. However, astronomers are still struggling to understand to what extent galaxy evolution is shaped by nurture, and which are the dominant physical processes involved. The key to resolving this outstanding issue is to study the cold gas component, and its relation to star formation, in galaxies across a range of environments. This project will combine an unrivalled data set, which includes the most sensitive measurements of atomic and molecular hydrogen gas currently available, with state-of-the-art numerical simulations with the aim of revealing the physical mechanisms responsible for transforming galaxies in the group environment.

DP150104172 Crewther, Prof David P

2015 \$125,000.00

2016 \$124,700.00

2017 \$130,000.00

Total \$379,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Swinburne University of Technology

Project Summary

Human behaviour is dominated by the visual system. This project proposes to trace the M, P, K neural systems isolated through Red/Green, Blue/Yellow and luminance stimuli to investigate processing for percepts of and attention to colour, motion and form in neurotypical humans. Nonlinear magnetoencephalography (MEG) is intended to provide the temporal structure of the different neural streams that feed these percepts. MEG based population receptive field analysis from virtual electrodes, will provide information about cortical feedback. A new theory of perception is expected to emerge, incorporating connections with contextual and top-down cognitive processes, furthering basic understanding.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102987 Croton, A/Prof Darren J; Ryan-Weber, Dr Emma V; Hassan, Dr Amr H

2015	\$118,441.00
2016	\$113,600.00
2017	\$118,441.00
Total	\$350,482.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation Swinburne University of Technology

Project Summary

Everything we see in the Universe, from galaxies to planets, started its life as cosmic gas. At very early times the hydrogen in this gas underwent an important transformation, called reionisation, triggered by the birth of the first stars. Understanding this transformation is a key outstanding question in modern astrophysics and sets up the conditions for all that follows. This project will combine innovative supercomputer simulations of cosmic gas and galaxies, with Keck observations of real diffuse gas and galaxies up to 12 billion light years distant. The project aims to distinguish between two popular reionisation scenarios. The simulations will be made public to the astronomical community.

DP150100887 Given, Prof Jock D; Cave, Prof Martin; Bohlin, Prof Erik

2015	\$112,349.00
2016	\$123,500.00
2017	\$124,749.00
Total	\$360,598.00

Primary FoR 2001 COMMUNICATION AND MEDIA STUDIES

Administering Organisation Swinburne University of Technology

Project Summary

Radiofrequency spectrum is the critical input that enables wireless communication. Existing spectrum management tools were constructed to deal with scarcity. This project aims to reconceptualise spectrum management as technological developments reduce scarcity. In four overlapping stages, an international research team aims to investigate the regulatory implications of emerging technologies that share spectrum; conduct fifteen case studies of spectrum 'refarming' around the world over the last two decades, including secondary trading, public reallocations and renewals; explore models for dynamic integration of spectrum sharing and refarming; and publish an accessible intellectual history of a unique resource.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102972 Jia, Dr Baohua

2015	\$140,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$375,100.00

Primary FoR 0205 OPTICAL PHYSICS

Administering Organisation Swinburne University of Technology

Project Summary

High performance and environmentally friendly on-chip power system is the key bottleneck issue limiting the further performance improvement and miniaturisation of ever-increasing portable optoelectronic devices. Building on previous work, including recent breakthroughs of on-chip photonic devices in patterned graphene oxide thin film and the record-breaking nanophotonics solar cells, the project aims to investigate a new concept of super-resolution direct laser printing and simultaneous dopant activation of graphene oxide thin films. It is expected that the conceptually new development of the functional graphene oxide film patterning will allow for smart solar-powered on-chip power systems that outperform the state-of-the-art pollution generating batteries.

DP150103177 Leontini, Dr Justin S; Sheridan, Prof John; Lo Jacono, Dr David

2015	\$170,000.00
2016	\$95,900.00
2017	\$90,000.00
Total	\$355,900.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation Swinburne University of Technology

Project Summary

This project aims to expand substantially the state of knowledge on the flow-induced vibrations of bluff, slender structures such as cylinders, beams, and cables. A framework is expected to be developed that describes the flow-induced vibration of these structures systematically, adding new data and drawing links between previously disparate areas of research. The significance of such a framework is great, as not only is flow-induced vibration a problem in many engineering applications (such as marine oil risers, chimneys, and bridges) it can also be exploited for renewable energy generation. Control mechanisms are also expected to be developed to maximise the energy generation potential.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101775 Yang, Prof Yun

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation Swinburne University of Technology

Project Summary

Cloud computing is a rapidly growing paradigm for Software-as-a-Service (SaaS). For enabling broad applications of a huge number of services available in the cloud, quality management for service-based systems is critical. This project aims to cover smart quality management for the whole lifetime of SaaS from service composition to service delivery. The project is expected to offer a novel solution for managing both build-time service selection and runtime service monitoring and adaptation by inventing corresponding innovative efficient and effective strategies for quality management. Given the prediction that the SaaS market will grow from \$13.5 billion in 2011 to \$32.8 billion in 2016, the success of this project is anticipated to translate into scientific and economic value.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Melbourne

DP150102503 Ahmed, Dr Farrah; Evans, Prof Carolyn; Rhoades, Prof Helen M; Krayem, Dr Ghena

2015 \$113,000.00

2016 \$118,900.00

2017 \$98,000.00

Total \$329,900.00

Primary FoR 2201 APPLIED ETHICS

Administering Organisation The University of Melbourne

Project Summary

The question of whether the Australian legal system should recognise Islamic family law processes has attracted increasing debate in recent years, reflecting similar developments in other countries. Underpinning opposition to legal recognition are concerns that such processes disadvantage Muslim women. Despite these claims, little is presently known about the impact of these processes or about the experiences of Muslim women who use them. This project, which combines expertise in law and religion and family law, aims to provide the first detailed empirical and normative examination of this question in Australia, offering a unique evidence base to inform future policy developments.

DP150100201 Baker, A/Prof Felicity; Rickard, A/Prof Nikki S; Ponsford, Prof Jennie L; Tamplin, Dr Jeanette; MacDonald, Prof Raymond A

2015 \$114,115.00

2016 \$124,600.00

2017 \$133,225.00

Total \$371,940.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The University of Melbourne

Project Summary

Thousands of Australians present with fractured identities following acquired spinal or brain injuries which can diminish their capacity to participate in and contribute to society. This project aims to investigate the effect of a song writing intervention on reconstruction of a meaningful integrated identity and psychological wellbeing post-injury. It aims to construct a model of mechanisms of change, identify factors influencing change and explore the role of musical identity in the process of identity reconstruction. It is expected that the findings will show evidence that song writing can enhance wellbeing, improve self-concept, and increase social and economic participation in society.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103315 Bardini, Dr Caroline; Pierce, A/Prof Robyn U; Stacey, Em/Prof Kaye C

2015	\$80,000.00
2016	\$71,900.00
2017	\$55,000.00
Total	\$206,900.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation The University of Melbourne

Project Summary

This project seeks innovative reasons for low progression rates of students in mathematical sciences subjects in Australia. It will examine students' symbol use at university and explore how it differs from the use at school. It will also examine links between students' response to increased symbolic load and their confidence to continue studying subjects with high mathematical content at university. Theoretical outcomes are expected to include new applications of epistemology and didactics theories and identification of key components of symbol load (for example, symbolic density, symbol familiarity) to describe how mathematical practices change with educational level. Practical outcomes are expected to include advice for educators with examples across the mathematical sciences.

DP150100504 Beaton-Wells, Prof Caron Y; Arup, Prof Christopher J; Merrett, Prof David T; Dixon, A/Prof Jane M

2015	\$54,000.00
2016	\$94,900.00
2017	\$118,000.00
2018	\$106,000.00
Total	\$372,900.00

Primary FoR 1801 LAW

Administering Organisation The University of Melbourne

Project Summary

The major supermarket chains have a substantial economic and social impact on consumers, businesses and communities and are crucial to Australia's economic growth and productivity. Given their size and reach, regulation of the chains poses significant challenges. This interdisciplinary, empirical and theoretically driven project aims to interrogate the goals and processes of competition law as it applies in the retail grocery sector. In the first Australian research of its kind, it endeavours to explain how the chains' strategies and industry relationships influence regulatory action. The research is expected to produce recommendations on instruments and techniques to ensure that regulation of the sector is legally and practically efficient and effective.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101427 Bieske, Prof Evan J

2015	\$150,000.00
2016	\$134,300.00
2017	\$125,000.00
2018	\$125,000.00
Total	\$534,300.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Melbourne

Project Summary

This project will combine sophisticated laser and mass spectrometric techniques to probe the structure and function of cryogenically cooled biological molecules that are the core operational units for vision, photosynthesis and protein labelling. Knowledge gained from the project will be used to calibrate modern computational approaches to describing and predicting molecular function. It is expected that the project will provide foundations for understanding and optimising the biological systems upon which life depends, and for developing new light-activated molecular devices including molecular motors, switches and energy harvesting systems.

DP150100353 Boskovic, Dr Colette; Sorace, Dr Lorenzo

2015	\$140,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$375,100.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Melbourne

Project Summary

The aims of this project are to synthesise new smart molecular materials and elucidate the chemical origin of the physical properties they exhibit. Exposure of these transition metal-based compounds to heat or light will induce changes in colour and magnetic behaviour, affording potential roles as the smallest possible electronic components or addressable entities for high density data storage. It is expected that the materials will also exhibit tunable thermochromic and photochromic properties, which are important for applications in photoresponsive devices or temperature sensors. The structure-function relationships determined will inform the development of molecular materials for future nanodevices, sensors or displays.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104051 Burnard, Prof Trevor G

2015	\$45,000.00
2016	\$38,400.00
2017	\$55,000.00
Total	\$138,400.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Melbourne

Project Summary

British Guiana became the most important slave colony in the British Empire following the abolition of the slave trade. Its history and the experience of the slaves who made up the majority of its population is the focus of this project, designed so that rich archival sources will be used to enable slaves to speak directly about their experience. This project is expected to illuminate the character of slavery and slave resistance in an especially profitable but harsh slave society in a late period of slavery. It is intended to explore the alternative kinds of colonisation that were possible in the early nineteenth-century British Empire, to deepen our understanding of slave management in plantation societies and to contribute to the historical analysis of race and slavery.

DP150100962 Crawford, Dr Robert H; Wiedmann, A/Prof Thomas O; Stephan, Dr Andre

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1202 BUILDING

Administering Organisation The University of Melbourne

Project Summary

This project aims to investigate the environmental impacts of construction in Australia through the development of a sophisticated hybrid environmental assessment model. The project aims to assist in identifying the most significant environmental impacts, critical areas for mitigation efforts and informing environmental policy and programs within the Australian construction industry. The development of one of the most sophisticated and comprehensive models for assessing environmental impacts ever produced is expected to enable cost- and time-efficient evaluation of multiple environmental impacts at a high level of detail and completeness. This should lead to considerable improvements to the environmental performance of Australian construction projects.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103736 Crozier, A/Prof Kenneth B; Alu, A/Prof Andrea

2015	\$211,000.00
2016	\$161,100.00
2017	\$172,000.00
Total	\$544,100.00

Primary FoR 0205 OPTICAL PHYSICS

Administering Organisation The University of Melbourne

Project Summary

Recent years have seen staggering growth in the prevalence of digital cameras. Conventional digital cameras are designed to mimic the response of the human eye, and therefore record the intensities of three spectral channels: red, green and blue (RGB). This project aims to harness recent advances in nano-optics for the realisation of a new generation of digital cameras. Rather than performing simple colour (RGB) imaging, these will be capable of multispectral and polarisation-resolved imaging, whose richer information will be beneficial for applications from medical diagnostics to industrial quality control. These capabilities will be enabled by optical nanostructures that deflect light in a wavelength- and polarisation-dependent manner.

DP150101156 Dagastine, A/Prof Raymond R; Manor, Dr Ofer

2015	\$160,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$120,000.00
Total	\$534,700.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation The University of Melbourne

Project Summary

Advanced materials assembled from engineered particles found in next generation solar cells, nano-electronics, photonic materials, and nano-sensors have experienced an explosion in research interest over the past decade. This is in large part due to improving techniques for the synthesis of anisotropy in particle shape to form rods, plates, iso-hedra and nano-prisms and material properties such as janus particles used for self-assembly. However, there is a lack of methods to measure the interactions that control the assembly process. This project aims to develop a novel method to quantify the particle-particle and particle-surface interactions for anisotropic particles to enable predictive approaches to particle assembly for advanced materials.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101857 Edmond, Prof Chris

2015	\$30,000.00
2016	\$30,000.00
2017	\$30,000.00
2018	\$30,000.00
Total	\$120,000.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Melbourne

Project Summary

This project will build a macroeconomic model to attempt to understand how an economy should manage structural adjustment to economic shocks (such as a substantial change in trade policy, significant exchange rate appreciation, or major technological change) in order to induce the reallocation of labour and other factors of production across different sectors of the economy. Two key features of the model will be human capital specificity, that is, skills may not be easily transferrable across sectors of the economy, and incomplete markets for income risk so that the burdens of adjustment may be concentrated on displaced workers rather than being efficiently shared. Various policies for managing adjustment will be evaluated quantitatively.

DP150104473 Evans, Prof Robin J; Sithamparanathan, Dr Kandeepan; Parampalli, A/Prof Udaya

2015	\$90,000.00
2016	\$143,900.00
2017	\$90,000.00
Total	\$323,900.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

Automobile radar systems are an important technology for improving road safety by providing advanced driver warnings in vehicles. Though such devices currently exist in practice there is no guarantee that they will operate successfully when deployed on a mass scale in every vehicle given the limited allocated frequency spectrum. The spectral interference due to radar access becomes a major issue when several radars operate in a confined bandwidth simultaneously, potentially leading to a complete system failure during mass deployment. This project will conduct fundamental research intended to enable dynamic spectrum accessing in automobile radars and redesign the radar systems in the form of sequence and waveform designs to suit requirements.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102788 Franks, Prof George V

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

Most advanced materials are produced from starting materials in the form of fine particles. Powders, especially in ceramic engineering, are first processed wet into near-final shape. Improved understanding of the fracture of particle networks is critical in order to process nano-sized advanced ceramic materials for use in solar energy harvesting and extreme heat engine applications as well as minimising drying cracks in paints and coatings. The research aims to identify the fundamental link between particle network strength and structure and the fracture of wet powder bodies. The microscopic mechanisms that control the behaviour will be investigated with a particular focus on toughening mechanisms including the influence of plasticity.

DP150103512 Halgamuge, Prof Saman K; Hsu, Dr Arthur L; Saeed, Dr Isaam; Tang, Dr Sen-Lin; Niranjan, Prof Mahesan

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Melbourne

Project Summary

The project aims to investigate the recently proposed promising machine learning paradigm "Near Unsupervised Learning" by critically analysing and comparing existing methods. The project also aims to develop new algorithms in the broader spectrum of Big Data Analytics and their adaptation to the following three applications: species separation in metagenomic data; development of a model to relate genomic information to cancer drug sensitivity; and, the identification of distinct metabolite distribution patterns in mass spectrometry metabolomic data. The potential outcomes include increased understanding of the usefulness of fertilisers on different plant varieties and newly emerging plant diseases, genomic variations in cancer and more insights into microbes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103053 Haslam, Prof Nick O; Loughnan, Dr Stephen

2015	\$70,000.00
2016	\$70,000.00
2017	\$70,000.00
Total	\$210,000.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Melbourne

Project Summary

Violence and discrimination are serious problems facing women in Australia. This project examines how sexual objectification contributes to these problems, investigating the process from both the perpetrator's and the victim's perspectives. Using a multi-method approach, the project is expected to show how objectification hampers women in their personal and professional lives. Importantly, the project aims to go beyond identifying the harm caused by objectification to start examining ways in which it can be reduced and women can protect themselves from its effects. This is expected to provide insight into a previously unstudied psychological cause of violence and discrimination against women, and map ways of reducing its harm.

DP150100692 Hutton, A/Prof Craig A

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation The University of Melbourne

Project Summary

The synthesis of amide bonds is one of the most important techniques in organic chemistry. Amide bonds are formed in the production of 65% of all pharmaceuticals, representing one sixth of all chemical processes in this industry. Coupled with the growing significance of peptide-based therapeutics, in which amide bond formation is the central pillar, novel and efficient amide ligation strategies are of great importance. This project aims to develop new synthetic methods for the construction of amides, based on the silver-promoted reaction of carboxylic acids and thioamides. Applications to the synthesis of peptides in the nitrogen-to-carbon direction will be developed, which are expected to enable solid-phase synthesis of carbon-terminally modified peptides, such as thioesters.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102703 Jamieson, Prof David N; Prawer, Prof Steven; Cohen, Prof Marvin L

2015	\$140,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$384,900.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of Melbourne

Project Summary

This project aims to engineer electrical and magnetic structures in diamond that can be measured at the nanoscale by ultra-sensitive magnetometers formed in-situ by nitrogen-vacancy colour centres. By careful control of ion implanted acceptor atoms the project will examine the transition of the diamond lattice from semiconducting, to magnetic, to superconducting phases predicted to exist from advanced theory. It is expected that the project outcomes will open the way to monolithic integration of diamond based quantum devices that exploit the remarkable attributes of the diamond lattice and the long-lived nitrogen-vacancy quantum bit subject to intensive study worldwide.

DP150101191 Jones, Dr Theresa M; Elgar, Prof Mark A; Visser, Prof Dr Marcel E; Gaston, Prof Kevin J

2015	\$141,000.00
2016	\$110,300.00
2017	\$100,000.00
Total	\$351,300.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

The presence of artificial light at night (LAN) is one of the most profound recent changes in urban ecosystems. Correlated with increases in LAN are declines in the survival and fitness of species living in urban environments. This project aims to use a multi-disciplinary approach to explore the effect of LAN on survival, reproduction and physiology. It integrates field surveys with laboratory and field experiments and aims to utilise sophisticated physiological assays to identify the links between LAN, melatonin, immunity, survival and reproduction. The intended outcome of this research is to provide fundamental insights into the biological consequences of LAN at the species and community levels.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100977 Kentish, Prof Sandra E

2015	\$110,000.00
2016	\$138,100.00
2017	\$123,000.00
Total	\$371,100.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

This project aims to understand the permeation of water through commercially relevant non-porous polymeric membranes. Permeation, solubility and diffusivity will be studied in the vicinity of the glass transition temperature to elucidate the changes in free volume that occur through this transition. Non-linear concentration gradients due to anisotropic swelling will be probed using novel laminated membrane systems. Water clustering will be evaluated by Fourier transform infrared spectroscopy and nuclear magnetic resonance. Results are proposed to be used to build a new phenomenological model of water permeation that can be used directly by engineers in the design of industrial membrane systems.

DP150102496 Kim, Dr Jee Hyun; Paolini, Prof Antonio G

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Melbourne

Project Summary

Memory expression can easily be reduced through the process of extinction, which involves repeated presentations of cues involved in that memory but without any outcome. In adult animals (including humans), it is widely accepted that extinction leads to a temporary inhibition of the original memory that remains largely unaltered. Remarkably, extinction causes erasure in juvenile rodents so that the original memory is permanently reduced. This is because the normal maturational changes in the brain result in fundamental developmental differences in the neural network underlying extinction. This project aims to map out this network across life, and also to reproduce the juvenile network in adult rats to erase memories via extinction in adulthood.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103987 King, Prof Ian P

2015	\$37,000.00
2016	\$36,400.00
2017	\$40,000.00
Total	\$113,400.00

Primary FoR 1401 ECONOMIC THEORY

Administering Organisation The University of Melbourne

Project Summary

This project would provide the first internally consistent theory of wage inequality, unemployment and economic growth - and the roles that government policy variables play in determining them. It would use and extend frontier developments in theory, and identify the settings of policy variables (unemployment insurance, tax structures, education policies) that maximise social welfare, given that governments must satisfy their budget constraints. It also aims to uncover the relationship between the innate abilities of workers and their education choices - and the consequences for macro economies and public policy.

DP150102593 Klewicky, Prof Joseph C

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Melbourne

Project Summary

Predicting and controlling turbulent fluid flow next to a solid surface (the turbulent boundary layer) is of critical importance to ensuring a sustainable energy and environmental future. While recent research has yielded a clearer physical understanding of these flows, converting this understanding into tools useful to engineering practice remains a central obstacle. The proposed research directly addresses this fundamental challenge by precisely connecting the eddy interactions of the turbulence to the mathematical equations that rigorously describe these flows. As such it holds breakthrough potential toward the development of turbulent boundary layer prediction and control schemes that do not rely on ad hoc models or assumptions.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102087 Kowal, Dr Emma; Paradies, Prof Yin C; Fforde, A/Prof Cressida

2015	\$54,105.00
2016	\$79,500.00
2017	\$63,548.00
Total	\$197,153.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Advances in genomics are expected to have profound impacts on contemporary identities, including Indigeneity. A focus on social processes since the 1970s has left scholarship on Indigenous identity ill-equipped to grapple with the consequences of the genomic era. Drawing on multidisciplinary expertise, Indigenous and non-Indigenous investigators intend to examine biological and social influences on Indigeneity in narratives of self-presentation and in two fields currently being transformed by genomics: ancestry testing and repatriation. The project is expected to develop and test a biosocial model of Indigeneity to enhance existing knowledge of Indigenous identification as a critical factor in monitoring and improving the health and wellbeing of Indigenous people.

DP150101977 Lim, Prof Christina; Nirmalathas, Prof Ampalavanapillai; Wong, A/Prof Elaine

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Melbourne

Project Summary

With an unprecedented 11-fold growth in mobile data services expected over the next five years, wireless networks are facing a fundamental challenge in supporting this enormous traffic. In meeting this challenge, next generation wireless networks need to offer services over smaller cells with a significantly larger number of base-stations, thus allowing high capacity connection to the global internet (backhaul). The aim of this project is to formulate optimisation methodologies for a sustainable energy-efficient small cell backhaul infrastructure. Through integration with the optical fibre infrastructure, the research will address network planning, design, and optimisation in terms of performance, cost-effectiveness, and energy efficiency.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100206 Lynch, Prof Gordon S; Ryall, Dr James G

2015	\$119,412.00
2016	\$150,300.00
2017	\$141,913.00
2018	\$178,629.00
2019	\$143,542.00
Total	\$733,796.00

Primary FoR 1004 MEDICAL BIOTECHNOLOGY

Administering Organisation The University of Melbourne

Project Summary

The project aims are to identify the metabolic factors that regulate muscle stem cell identity and to examine how changes in the local metabolic environment can influence how stem cells respond to biological perturbations. One of the most important and unresolved issues in skeletal muscle biology is understanding the role of muscle stem cells in the regulation of growth and development, adaptation and plasticity. We have identified that the local skeletal muscle metabolic milieu may regulate the activity of skeletal muscle stem cells. This project could reveal novel mechanisms by which skeletal muscle stem cells can be regulated. This information is crucial for our fundamental understanding of stem cell biology and its future applications.

DP150102964 Maree, Dr Claire

2015	\$61,797.00
2016	\$58,000.00
2017	\$44,673.00
Total	\$164,470.00

Primary FoR 2004 LINGUISTICS

Administering Organisation The University of Melbourne

Project Summary

This project analyses how varieties of language (dialect, gendered speech styles, youth slang) are written onto the screen in audiovisual media as subtitles and impact-captions. It explores the attitudes held by editors, producers and translators towards language which influence this process. It aims to use the Japanese global media, which is well-known for its heavy use of text-on-screen and its rich diversity of language styles, as a case study. This is expected to lead to a greater understanding of textual representation of identity in contemporary digital media.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101704 Martin, Dr Andrew M; Scholten, Prof Robert E; Hollenberg, Prof Lloyd C; Budker, Dr Dmitry

2015	\$210,000.00
2016	\$181,800.00
2017	\$170,000.00
Total	\$561,800.00

Primary FoR 0206 QUANTUM PHYSICS

Administering Organisation The University of Melbourne

Project Summary

The quantum geometric phase has long been viewed as an interesting, but somewhat mysterious, feature of quantum mechanics. However, the ability to harness and control geometric phase in individual quantum systems may drive the development of a new class of quantum technologies. This project aims to measure, for the first time, geometric phase due to the macroscopic motion of an atom-scale quantum system, specifically in rotating nitrogen-vacancy defects in diamond. It is expected that these proof-of-principle measurements will provide the basis for the future development and design of new nano-scale quantum gyroscopes and set the foundations for using nano-diamonds as rotational diagnostic tools in a range of important nanoscopic systems.

**DP150100682 McCalman, Prof Janet S; Kippen, Dr Rebecca; Hopper, Prof John L; Reade, Prof Michael C;
McMeeken, Prof Joan M**

2015	\$232,000.00
2016	\$188,000.00
2017	\$140,000.00
Total	\$560,000.00

Primary FoR 1603 DEMOGRAPHY

Administering Organisation The University of Melbourne

Project Summary

What really happened to the Diggers after the war? In this centenary year of Gallipoli, it is still not known. It is not known how long they lived nor how they compared in health and family formation to civilians. Did some recover from trauma and exposures over time? Did the Repatriation Scheme and medical care make a difference? What social and biological characteristics may have affected risk, resilience and recovery? And what can be learnt about the lifelong impact of war exposures and traumas, to assist in the recovery of today's servicemen? This project aims to be the world's first cradle-to-grave medico-demographic study of survivors of military service in World War I, drawing on Australia's unique archive of service and veteran medical records.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103330 McPherson, Prof Gary E; Evans, Dr Paul A; Williamon, Prof Aaron; Ryan, Prof Richard M; Miksza, A/Prof Peter; Zimmerman, Prof Barry J

2015	\$120,000.00
2016	\$86,300.00
2017	\$80,000.00
2018	\$90,000.00
Total	\$376,300.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The University of Melbourne

Project Summary

This project examines motivation and practice quality in elite music performance. It applies major theoretical explanations from other domains where optimising motivation and practice quality has consistently been found to increase performance, persistence, learning, creativity, and wellbeing. The expected outcomes of the project address the competitiveness of Australian musicians, particularly in light of significantly lower funding for music institutions compared to international counterparts. The research endeavours to inform understandings about the nature of motivation and practice more generally, by extending conceptions that have until now been formed largely through research in non-artistic domains of human accomplishment.

DP150100597 Metcalfe, Prof Sylvia A; Newson, Dr Ainsley J; Gray, Dr Kathleen; Terrill, Ms Bronwyn N; Gaff, A/Prof Clara L; Middleton, Dr Anna; Wilson, Prof Brenda J

2015	\$180,000.00
2016	\$182,200.00
2017	\$220,000.00
Total	\$582,200.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Melbourne

Project Summary

This multi-disciplinary project aims to be the first to explore the Australian public's awareness of new developments in genetic science that allow healthy individuals to access their own genetic makeup. Called 'personal genomics', this broad group of genetic tests can be used for a variety of purposes that include ancestry, paternity, sporting ability and health. These tests are developing at a rapid rate yet little is known about why, how and where they are used by the public. This project will employ a mixed methods approach to examine how the public might engage with this new technology. The research aims to help define educational strategies and supports and thereby to inform national policy for personal genomics.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102887 Moresi, Prof Louis N; Betts, A/Prof Peter G; Whittaker, Dr Joanne M; Miller, Prof Meghan S

2015	\$150,000.00
2016	\$172,600.00
2017	\$180,000.00
2018	\$150,000.00
2019	\$60,000.00
Total	\$712,600.00

Primary FoR 0404 GEOPHYSICS

Administering Organisation The University of Melbourne

Project Summary

This project will use a combination of 3D geodynamic modelling, plate kinematic reconstruction and geological and geophysical synthesis to determine how congested subduction zones influence plate kinematics, subduction dynamics and tectonic evolution at orogen and global scales. The project aims to deliver a transformation change in understanding the links between congested subduction, mantle flow, trench migration, crustal growth, transitions between stable convergent margin configurations and deformation in the overriding plates of subduction zones. Determining these relationships is significant because it will provide dynamic context to interpret the geological record of ancient convergent margins, which host a large percentage of Earth's metal resources.

DP150102569 Moseley, Dr Gregory W; Wang, Prof Linfa; Lamond, Prof Angus

2015	\$150,000.00
2016	\$143,900.00
2017	\$75,000.00
2018	\$75,000.00
Total	\$443,900.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Negative strand viruses (NSVs) include diverse animal pathogens that represent significant threats to Australian livestock industries and access to export markets. The project aims to investigate the interface formed by NSVs with cellular nucleoli in order to determine roles in viral manipulation of cell biology during infection. This project hopes to address a major gap in knowledge in virology regarding the fundamental biology of NSVs, and is expected to redefine our understanding of the virus-host interactions formed by these important pathogens. By determining the mechanisms of NSV-nucleolus interaction, the project plans to also provide important information for the development of new vaccines/therapeutics for livestock to combat NSVs that target nucleoli.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101652 Mulder, A/Prof Raoul A; Langmore, Dr Naomi E; Delhey, Dr Kaspar; Lyon, Prof Bruce

2015 \$135,000.00

2016 \$138,100.00

2017 \$119,000.00

Total \$392,100.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Melbourne

Project Summary

Darwin's theory of sexual selection is remarkably successful in explaining how elaborate signals evolved in male animals, but it is unclear whether similar processes drive the evolution of female signals. This project aims to conduct empirical and comparative tests of hypotheses for female trait elaboration, capitalising on inter- and intra-specific variation in female signal form, social organisation and signalling environments. The project could generate new insight into the processes that promote and constrain phenotypic diversity in nature.

DP150101388 O'Hair, Prof Richard A; Canty, Prof Allan J; Dugourd, Prof Philippe

2015 \$140,000.00

2016 \$124,700.00

2017 \$130,000.00

Total \$394,700.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation The University of Melbourne

Project Summary

Metal catalysts play important roles in the multi-billion dollar production of many industrial and fine chemicals used in wide-ranging applications including pharmaceuticals, insecticides and polymers. Despite the importance of metal catalysed reactions, the molecular details of such processes remain poorly understood. Breakthrough studies highlight that reactions previously thought to be catalysed by discrete metal catalysts are in fact catalysed by metal nanoclusters. This project involves the application of advanced mass spectrometric and computational methods to explore the formation and reactivity of copper, silver and gold nanoclusters. Identification of key reactive intermediates will inform the design of next generation catalysts.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100673 Parker, Prof Michael W

2015	\$166,207.00
2016	\$150,300.00
2017	\$136,074.00
2018	\$141,789.00
2019	\$146,210.00
Total	\$740,580.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

This project examines how a major family of chloride channels and pumps, found in nearly all organisms, works at the molecular level and how it is modulated by chemical signals from within cells. The expected outcomes are to demonstrate novel mechanisms general to these essential proteins and to provide fundamental insights in understanding vital physiological processes across all kingdoms of life. Ultimately, this work aims to lead to the development of novel engineered proteins that can act as sub-microscopic electrical 'switches' and highly specific sensors for a variety of molecules for nanotechnology and biotechnology applications.

DP150103495 Persson, Dr Staffan

2015	\$143,000.00
2016	\$150,600.00
2017	\$160,000.00
Total	\$453,600.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

This project aims to delineate how two components, that are part of a protein-complex, synthesise cellulose and protect the complex against environmental stress function. Also, it aims to identify co-factors that assist in cellulose synthesis and microfibril assembly. Sustainable resources for fuel, food and feed are needed and plant biomass, largely consisting of cellulose, offers a great raw material for this purpose. However, our understanding of how cellulose is synthesised is rudimentary. The results of this project could contribute towards tailoring cellulose production for industrial applications and for sustained biomass production.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103208 Reichardt, Dr Christian L

2015	\$119,000.00
2016	\$114,100.00
2017	\$119,000.00
2018	\$119,000.00
2019	\$119,000.00
Total	\$590,100.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Melbourne

Project Summary

The abundance of galaxy clusters, the most massive collapsed objects in the Universe, is exponentially sensitive to how structure forms. This project aims to discover massive galaxy clusters out to their redshift of formation in 2500 square degrees of sky using the Sunyaev-Zel'dovich effect. Galaxy clusters will be weighed using multi-frequency observations and the observed abundance of galaxy clusters will be used as a function of mass to address two fundamental questions in cosmology: what are the neutrino masses? and what is the nature of the dark energy that is driving the accelerating expansion of the Universe? The project will train young researchers in big data methods at the cutting edge of modern cosmology.

DP150103801 Restall, Prof Greg

2015	\$103,000.00
2016	\$113,200.00
2017	\$120,000.00
2018	\$120,000.00
2019	\$108,000.00
Total	\$564,200.00

Primary FoR 2203 PHILOSOPHY

Administering Organisation The University of Melbourne

Project Summary

This project aims to bridge philosophy, linguistics, logic and computation by developing proof-theoretical semantics for a comprehensive fragment of Montague Grammar (a formal language suited to analysing natural languages). It aims to show how this can be implemented in software, exploring and evaluating the philosophical assumptions grounding inferentialism and proof-theoretical semantics. It seeks to exploit and examine the connections between logic, linguistics philosophy and computer science and to chart how information is grounded in our interaction with the world and our norms for dialogue. The result is expected to be a more realistic and comprehensive understanding of logic and language, and tools for software that communicates more flexibly and effectively.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103710 Rubinstein, Dr Benjamin

2015	\$73,000.00
2016	\$70,000.00
2017	\$73,000.00
Total	\$216,000.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Melbourne

Project Summary

Technological advances such as cloud computing have disrupted thousands of businesses managing volatile compute loads. While elements of Big Data are now everywhere, still absent are wide-spread solutions for learning from data at scale-Big Machine Learning, the ultimate goal of Big Data. The greatest problems come not from a lack of distributed machine learning algorithms, but rather from preparing the data needed for fitting, evaluating and applying statistical models; often a manual, messy and costly process. This project proposes to develop advanced databases and statistical techniques for scalable and efficient data preparation, with the goal of bringing Big Machine Learning to a much broader range of users and businesses.

DP150100357 Scott, Prof Anthony; Yong, A/Prof Jong-Say; Sivey, Dr Peter; Gravelle, Prof Hugh S; Byrne, Dr David P

2015	\$100,000.00
2016	\$67,100.00
2017	\$110,000.00
2018	\$110,000.00
Total	\$387,100.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Melbourne

Project Summary

A sharp increase in the supply of medical practitioners has occurred in Australia. This is expensive and has uncertain effects on population health, earnings, and the distribution of medical practitioners. The aim of this project is to examine the impact of competition and increased supply on the prices charged, the quality of care provided, and the health status of patients. The research also aims to examine the location choices of medical practitioners and is expected to generate new and important evidence using unique longitudinal data.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100609 Sevier, A/Prof Martin E; Hara, A/Prof Takanori; Kuhr, Dr Thomas

2015	\$124,000.00
2016	\$107,400.00
2017	\$126,000.00
Total	\$357,400.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The University of Melbourne

Project Summary

The discovery of the Higgs boson at 126 GeV at CERN was a milestone for fundamental physics. However to date no other new discoveries have been made. This brings new urgency to the questions: what is the origin of Dark Matter? and why is there no large scale antimatter in the Universe? These questions require that new, as yet undiscovered principles of nature exist. This project will search for these by investigating matter-antimatter asymmetries with unprecedented precision at the Belle II experiment, currently under construction in Japan. The project's contribution to Belle II will be to develop software to rapidly and automatically calibrate and process the hundreds of petabytes of data generated by the experiment.

DP150104815 Shieh, Prof William; Chen, Dr Xi

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Melbourne

Project Summary

Coherent detection aided by high-speed electronic digital signal processors has transformed optical communications within the last decade. However, the high complexity of coherent detection has constrained its application to long-haul transmission. This project aims to propose a novel modulation format based on optical multiple-input multiple-output in Stokes space that can bridge the gap between coherent and non-coherent communication. The proposed research includes design, simulation, and experimental verification of the proposed Stokes vector detection. The successful implementation of the project is expected to provide enabling technologies to future high-speed transport for interconnecting data centres that underpin fast-growing cloud computing.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103254 Soncini, Dr Alessandro; Affronte, A/Prof Marco

2015	\$140,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$50,000.00
Total	\$444,700.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The University of Melbourne

Project Summary

One fact of computing life is that there's never enough storage. Storing information on single molecules would improve storage density by a factor of 10,000. A promising strategy is to arrange magnetic molecules on a surface, so that their spin can be accessed from one side in read/write operations. While much is known of magnetic molecules in crystals, their behaviour on a surface is still a puzzle. Using mathematical models and synchrotron experiments, the project will explore which combinations of molecules and surfaces exhibit the best magnetic behaviour. The expected results will be crucial for the development of a new generation of high-capacity and high-performing computers.

DP150101048 Stuart-Fox, Dr Devi; Dasmahapatra, Dr Kanchon K

2015	\$160,000.00
2016	\$163,000.00
2017	\$140,000.00
Total	\$463,000.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Speciation, the process by which populations diverge and become distinct, is the engine that drives biodiversity and Darwin's 'mystery of mysteries'. Speciation is accelerated in species with multiple, discrete, coexisting colour forms; yet the genetic mechanisms underpinning this pattern are not known. This project aims to identify the genes underlying different colour forms and how they are distributed across the genome. The project plans to test the prediction that these same areas of the genome show marked divergence between lineages that are in the process of becoming distinct species. Doing so may contribute significantly to our understanding of speciation, underlying genetic mechanisms, and genes generating colour variation in vertebrates.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101044 Stuart-Fox, Dr Devi; Pryke, Dr Sarah R

2015	\$141,000.00
2016	\$137,100.00
2017	\$131,000.00
Total	\$409,100.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Melbourne

Project Summary

This project aims to reveal how diverse colours are produced in reptiles and the information these colours convey about individual health, condition and performance. The project evaluates how stress affects both pigment deposition and the nano-structure of cells and tissues, which together produce colour. By comparing similar colours generated by two entirely different classes of pigment (carotenoids and pteridines), this project will provide new insights into the evolution of animal coloration, and will significantly enhance our understanding of pteridines, one of the most prevalent but least understood classes of pigment in vertebrates.

DP150100094 Treloyn, Dr Sally A; Thieberger, Dr Nicholas A; Jebb, Dr Mary Anne; Christen, A/Prof Kimberly; Dowding, Mr Andrew M

2015	\$121,081.00
2016	\$128,800.00
2017	\$109,608.00
Total	\$359,489.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The University of Melbourne

Project Summary

This project aims to investigate Indigenous song traditions of the western Pilbara through current practice and legacy recordings. It aims to show how public song traditions were used through the twentieth century as tools to manage environmental change. By recording and documenting songs and histories, and curating and developing an online collection of song-based digital heritage items with a virtual landscape interface, the project is expected to produce knowledge about the role of digital collections and cultural mapping in supporting the sustainment of endangered song traditions. It also aims to develop tools for use by communities and researchers to secure legacy, crowd-sourced and newly created records of intangible cultural heritages for the future.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100974 Turner, Dr Andrew J; Torello-Hill, Dr Giulia M; Chong-Gossard, Dr James H

2015 \$47,000.00

2016 \$30,000.00

Total \$77,000.00

Primary FoR 2005 LITERARY STUDIES

Administering Organisation The University of Melbourne

Project Summary

In the early Italian Renaissance at a time when theatrical infrastructure was still lacking, rapid advances in learning and technology helped scholars to show how the Latin plays, which had only survived as teaching texts, were in fact works to be performed, eventually leading to stage revivals. This project proposes to build on the successes of an Australian team working on the Roman playwright Terence, and demonstrate the importance of humanist scholars to intellectual history. It intends to utilise a range of historical resources, many only available in recent years through digitisation.

DP150103061 Urquijo, Dr Phillip; Nakao, A/Prof Mikihiko

2015 \$125,471.00

2016 \$108,600.00

2017 \$116,950.00

Total \$351,021.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The University of Melbourne

Project Summary

Particle physics aims to understand the fundamental constituents of matter and their interactions. This project aims to address long standing puzzles of matter, such as the origin of fundamental particle masses and the cosmological dark matter abundance, with the intensity-frontier Belle II detector and SuperKEKB collider complex in Japan. The project aims to secure the Australian position at the forefront of particle physics by leading the data preparation for Belle II, its ensuing detector commissioning and data analysis. It is expected that this project will provide unique insight in our endeavour to complete the theory of the universe at the smallest scale.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100705 Verbruggen, Dr Heroen; Chan, Dr Cheong-Xin; Bhattacharya, Prof Debashish; Olson, Asst Prof Bradley

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Plastid endosymbiosis events (enslavement of an algal cell inside of a host cell to form a plastid) are difficult to pinpoint because the genomic data required for a broad array of species are rarely available. Furthermore, the classical method used to infer endosymbiotic gene transfers is being criticised. This project will elucidate the origin of chlorarachniophyte and dinoflagellate plastids and characterise the genome dynamics following endosymbiosis. It uses densely sampled genome data obtained with high-throughput sequencing technologies. Simulation studies will be used to evaluate methods for inferring endosymbiotic gene transfer and alignment-free methods will be used to improve phylogenomic pipelines.

DP150101550 Verspoor, A/Prof Karin M; Zobel, Prof Justin

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Melbourne

Project Summary

The project aims to use natural language processing and information retrieval to reconcile and improve sources of biological information. Biological research has produced vast volumes of information about proteins, captured in structured resources (databases) and unstructured documents. However, the accuracy of much of this information is questionable. The project proposes to develop methods to validate data and reduce the dramatic inconsistencies in protein information resources by leveraging observed correlations and complementarity between them, and specifically through targeted fact extraction from the biomedical literature. These methods will be applied at scale across millions of published articles, to infer and validate functional information.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103525 Vilonen, Prof Kari; Xue, Dr Ting

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
2018	\$125,000.00
2019	\$125,000.00
Total	\$619,900.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Melbourne

Project Summary

This research project aims to study questions in representation theory of groups using geometric methods. A central role is played by Langlands program which, broadly understood, can be viewed as a grand unified theory of mathematics. One setting for the work is modular representation theory with the aim of understanding irreducible characters. The project also aims to work on combinatorics and geometry in algebraic groups in small characteristics and one goal is to obtain a more uniform geometric understanding across all characteristics. The project also aims to work in the context of real groups and with the Gukov-Witten "fix of the orbit method" via branes. Finally, the project expects to begin a study of deformations of Galois representations in a general context.

DP150102272 Walsh, Reader Kevin; Ramsay, Dr Hamish A; Camargo, Prof Suzana J

2015	\$98,000.00
2016	\$137,100.00
2017	\$143,000.00
Total	\$378,100.00

Primary FoR 0401 ATMOSPHERIC SCIENCES

Administering Organisation The University of Melbourne

Project Summary

In Earth's current climate, about 80 to 90 tropical cyclones form every year around the globe, but the reasons why cyclones form at this rate are unknown. This project will use a combination of theoretical techniques and numerical simulation to elucidate the links between large-scale climate and the rate of tropical cyclone formation. A series of climate model experiments will be performed that also have the potential to improve confidence in our predictions of tropical cyclone incidence in a future, changed climate.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101727 Webster, Prof Rachel L; Elvis, Dr Martin

2015	\$130,000.00
2016	\$111,000.00
2017	\$116,000.00
Total	\$357,000.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Melbourne

Project Summary

The spectra of quasars are very similar, despite a wide range of black hole masses, accretion rates, local environments and evolutionary states. Thus the key elements of quasar emission physics must be similar in all objects and scale in a straightforward way. This project aims to develop new observational programs to elucidate fundamental aspects of quasar physics and concurrently build numerical models to be tested against those observations. In particular, gravitational microlensing will be used to resolve emission regions on micro-arcsecond scales. This project aims to resolve long-standing questions about the nature of quasars, one of the extreme objects in our universe.

DP150100649 White, A/Prof Anthony R; New, Dr Elizabeth J

2015	\$160,000.00
2016	\$153,400.00
2017	\$160,000.00
Total	\$473,400.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Melbourne

Project Summary

Copper (Cu) plays essential roles in the functioning of brain cells, but the regulation and activity of this metal is poorly understood. This project aims to map sub-cellular Cu pools in brain cells, with particular emphasis on the effects of cellular stresses on these pools. These studies are expected to contribute important new methods for the study of Cu biology, and could provide valuable information about how Cu homeostasis is maintained or perturbed under various stresses. In the future, this work is expected to form the basis of studies of brain Cu pools in neurodegenerative diseases.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102409 Wilkins, A/Prof Roger K; Burkhauser, Prof Richard V; Jenkins, Prof Stephen P

2015	\$115,141.00
2016	\$114,600.00
2017	\$123,774.00
Total	\$353,515.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Melbourne

Project Summary

A major debate is raging on the growth of income inequality, especially in Anglo-Saxon countries. This project will use a cross-national framework to investigate income inequality and mobility in Australia, Britain and the United States of America. It will re-evaluate the tax-based evidence and reconcile it with household survey evidence. Using household panel data, it will comprehensively examine income mobility patterns, using a variety of mobility measures. It aims to show the sensitivity of income inequality and mobility patterns and trends to broader income measures. The project also aims to provide policymakers with a more accurate and complete understanding of Australian income inequality and mobility trends and their drivers within an international context.

DP150101459 Xia, A/Prof Aihua; Barbour, Prof Andrew D; Pollett, Prof Philip K; Ross, Dr Nathan F; Luczak, Prof Malwina J; Reinert, Prof Gesine D; Roellin, Asst Prof Adrian; Pekoz, Prof Erol

2015	\$210,000.00
2016	\$181,800.00
2017	\$200,000.00
Total	\$591,800.00

Primary FoR 0104 STATISTICS

Administering Organisation The University of Melbourne

Project Summary

The behaviour of many real world systems can be modelled by random discrete structures evolving over time. For example, the sizes of populations of frogs in some close patches of forests can be modelled as interacting random processes. The aim of the project is to investigate large discrete random structures that arise from real world application in areas such as biology, complex networks and insurance. The proposed project is at the interface of mathematics and 'big data' applications and so the work of the project aims to provide theoretical and heuristic underpinnings useful in the algorithms and techniques of practitioners. Understanding the applications in the project requires new, broadly applicable methods and developing such is a complementary aim.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103709 Young, Prof Heather M

2015	\$145,000.00
2016	\$141,900.00
2017	\$134,000.00
Total	\$420,900.00

Primary FoR 1109 NEUROSCIENCES

Administering Organisation The University of Melbourne

Project Summary

This project aims to examine the neural crest cells that colonise the developing gut and to identify why some cells advance while others stay behind to populate a region. Directed cell migration is essential for normal development, including for the nervous system. In most of the migratory cell populations that have been analysed to date, all of the cells migrate as a collective from one location to another. However, there are also migratory cell populations that must populate the areas through which they migrate, and thus some cells get left behind while others advance. The planned data are likely to be relevant to other cell populations that also populate the areas through which they migrate, including neural crest-derived melanocytes and Schwann cell precursors.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Victoria University

DP150104534 Lamb, Prof Stephen P; Slee, Prof Roger C; Nolan, Prof Andrea C

2015 \$100,000.00

2016 \$95,900.00

2017 \$110,000.00

Total \$305,900.00

Primary FoR 1301 EDUCATION SYSTEMS

Administering Organisation Victoria University

Project Summary

The project aims to shed light on how early childhood (EC) educators can address intergenerational educational disadvantage by raising aspirations for their own learning and for the children with whom they work. The project arises from a tension in the current reform agenda for the Australian EC sector. The goal is for all EC educators to be skilled, reflective professionals able to support children's learning, but many educators are from backgrounds of low educational aspirations and attainment. The project will use a mixed methods approach to investigate this tension. Australian and international career and workforce data will be used to examine characteristics of educators, supplemented by 40 case studies of educators at low qualification levels.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Queensland

Central Queensland University

DP150104497 Ferguson, Prof Sally A; Lack, Prof Leon; Aisbett, Dr Brad

2015 \$80,000.00

2016 \$76,700.00

2017 \$80,000.00

Total \$236,700.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Central Queensland University

Project Summary

The aim of the project is to assess the impact 'on-call' work has on sleep, stress, and next day performance. Two million Australians are on-call providing essential 24-hour services including emergency response. While sleep during on-call periods is disrupted when a call occurs, some research suggests that sleeping with one ear open waiting for a call may disrupt sleep even if no call occurs. If on-call sleep is less restorative, then individuals are at risk of performance impairment and adverse health outcomes. This project aims to answer questions about the magnitude of sleep disruption when on-call, the mechanisms for any disruption, and impact on waking function.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Griffith University

DP150100308 Berners-Price, Prof Susan J; Farrell, Prof Nicholas P; von Itzstein, Prof Mark

2015	\$160,000.00
2016	\$153,400.00
2017	\$160,000.00
Total	\$473,400.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation Griffith University

Project Summary

Proteoglycans and their associated enzymes are significant emerging drug targets of high biological relevance. This project explores a new approach to drug design based on high affinity binding to carbohydrates by polynuclear platinum compounds. Nuclear magnetic resonance spectroscopy studies will be used to delineate structure-activity relationships and the novel technique nano-scale secondary ion mass spectrometry will be developed to explore the mechanism of cellular uptake and sub-cellular distribution. The results will provide mechanistic understanding underpinning the future development of dual-action platinum anticancer drugs with both DNA binding and anti-angiogenic activity.

DP150102271 Connolly, Prof Rod M; Schlacher, Dr Thomas

2015	\$120,000.00
2016	\$124,700.00
2017	\$90,000.00
Total	\$334,700.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation Griffith University

Project Summary

The resilience of ecosystems in the face of major environmental disturbances is emerging as a major concern for modern ecology. Connectivity of ecosystem components is a critically important element of ecosystem function and should, theoretically, be central to system resilience. The relationship between connectivity and resilience, however, remains poorly substantiated by empirical data. By manipulating connectivity in laboratory experiments using a well-understood model marine system, the project aims to determine how connectivity affects resilience. It could provide a crucial step towards integrating connectivity into management and conservation of natural resources.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104006 Fry, Prof Brian; Olley, Prof Jonathon M; Burford, Prof Michele A

2015	\$180,000.00
2016	\$169,700.00
2017	\$151,000.00
Total	\$500,700.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation Griffith University

Project Summary

As humans modify the biosphere, many complex landscape-level problems are emerging. New methods are required to work on these large-scale problems. The aim of this project is to develop novel methods involving trace elements and isotopes, opening up new ways to explore the large-scale connections between terrestrial ecosystems and downstream estuaries. It is planned to use these new methods to test for unexpected positive benefits of floods for estuarine fisheries. The project is significant and innovative because it develops two fundamentally new types of tracer work, one at the sediment-animal level and one at the within-molecule level. The expected outcomes include a new toolkit for tracing the hidden connections between terrestrial and aquatic ecosystems.

DP150100606 Guan, A/Prof Hong; Gilbert, Dr Benoit P; Loo, Prof Yew-Chaye; Lu, Prof Xinzheng

2015	\$160,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$434,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation Griffith University

Project Summary

This project aims to systematically and thoroughly investigate the progressive collapse mechanisms and resistance capacity of concrete flat plate structures. They represent one of the most common construction systems used worldwide in modern days, yet their progressive collapse mechanisms require attention and limited collapse prevention design guidelines are available. The outcomes are expected to broaden and deepen the existing theoretical framework and knowledge base, prevent injury and loss of life in both new and existing buildings. This is expected ultimately to contribute to the establishment of a set of collapse-resistant design guidelines for further development of relevant Australian and international standards.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100007 **Lambert, Prof David M; Willerslev, Prof Eske; Millar, Dr Craig D; Baroni, Prof Carlo; Jarman, Dr Simon N**

2015	\$108,602.00
2016	\$105,500.00
2017	\$108,602.00
Total	\$322,704.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation Griffith University

Project Summary

This project proposes the first direct study of ancient ecology using a combination of second-generation DNA sequencing and targeted gene recovery. The food web of the Antarctic Ocean is a classic textbook example of energy and nutrient cycling in the marine environment. Although a great deal is known about the current status of this food web, understanding how this complex set of predator / prey relationships have changed over long periods of time is vital to understanding the nature of the system itself. The project intends to track changes in the diet of Adélie penguins from serially preserved ancient fecal (guano) remains dating back approximately 30,000 years. These remains are known to contain microscopic remnants of penguin prey.

DP150102820 **Neuzil, Prof Jiri**

2015	\$133,000.00
2016	\$126,600.00
2017	\$133,000.00
Total	\$392,600.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation Griffith University

Project Summary

The aim of this project is to show that cancer cells with heavily damaged mitochondrial DNA (mtDNA) can acquire the mitochondrial genome from the host and that this results in the recovery of their mitochondrial function. The project is highly significant, as it aims to show *in vivo* mitochondrial transfer with functional consequences. The project aims to open a new avenue of research and could result in a shift in our understanding of some features of cellular communication and how cells can overcome unfavourable situations.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101166 Oaten, Dr Megan J; Stevenson, Prof Richard J; Chambers, Prof Suzanne K; Kurzban, A/Prof Robert

2015	\$80,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$30,000.00
Total	\$325,500.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Griffith University

Project Summary

The aim of this project is to test a disease avoidance model of stigmatisation. Stigmatisation is characterised by chronic avoidance of a person(s) by other people. Infectious disease may produce an apparently similar form of isolation—disease avoidance. This project proposes that many forms of stigmatisation reflect the activation of this disease avoidance system, which is predisposed to respond to signs of disease, irrespective of their accuracy. This will represent a significant shift in thinking about this issue and aims to provide the first empirically based model of stigmatisation as an evolved disposition that causes the exclusion of people who look like they may carry an infectious disease - even if they do not.

DP150104133 Sattar, Prof Abdul; Nayak, A/Prof Abhaya C; Delgrande, Prof James P

2015	\$110,000.00
2016	\$107,400.00
2017	\$114,000.00
Total	\$331,400.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation Griffith University

Project Summary

We operate in complex dynamic environments including highly sensitive and safety-critical situations such as medical emergencies, disaster management and air-traffic control systems. Our knowledge of what causes what plays a pivotal role in making correct decisions in such situations. To ensure robustness and sound behaviour of the underlying causal knowledge systems, their designs and implementations must be formally well grounded. This is an important but difficult challenge. This project aims to systematically develop a logic-based framework to adequately capture and reason about evolving causal knowledge. This research is expected to form the basis for smart decision making, and be evaluated on practical applications.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101618 Su, A/Prof Kaile; Sattar, Prof Abdul; Thornton, A/Prof John R; Pham, Dr Duc N

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation Griffith University

Project Summary

A wide range of practical problems such as scheduling, timetabling, planning and economic forecasting are not only computationally intractable in general, but often involve conflicting constraints that make them unsolvable. These problems can be represented as MaxSAT, the optimisation version of the satisfiability problem (SAT). This project aims to develop novel and efficient algorithms to address the problem of maximal satisfaction. It is proposed that these algorithms will be implemented within prototype MaxSAT solver systems, which will be experimentally evaluated on large-sized real world optimisation problems of high economic and societal significance. These solvers are expected to also compete in the industrial track of the international SAT solving competitions.

DP150103775 Zhao, Prof Huijun; Zhang, Dr Haimin; An, Prof Taicheng; Ma, Prof Wanhong

2015	\$110,000.00
2016	\$94,000.00
2017	\$90,000.00
Total	\$294,000.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Griffith University

Project Summary

Effective control of the quality of water supply is paramount for public health. This project aims to develop a novel photoelectrocatalysis (PEC) based bactericidal technology capable of instant inactivation and rapid decomposition of waterborne pathogens in recycled water. The PEC processes at the illuminated semiconductor photoanodes with ultraviolet (UV) and visible light activities will be innovatively utilised with the aim of in-situ generation of stable di-halide radical anions, reactive oxygen species and photoholes as effectual bactericides to achieve instant inactivation and rapid decomposition of waterborne pathogens. The success of the project is expected to provide Australian water industry with enabling technology to safeguard recycled water usage.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

James Cook University

DP150100588 Cernusak, Dr Lucas A; Farquhar, Prof Graham D; McDowell, Prof Nate

2015 \$180,000.00

2016 \$162,100.00

2017 \$169,000.00

Total \$511,100.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation James Cook University

Project Summary

This project aims to determine when and to what extent the air inside leaves becomes unsaturated with water vapour. All current interpretation and modelling of leaf gas exchange assumes saturation under all circumstances. Compelling evidence has been obtained that suggests this is not true under moderate air vapour pressure deficits. A novel technique will be employed to assess the water vapour concentration of the air inside leaves based on stable isotope analysis of carbon dioxide and water vapour exchanged between leaves and air. The project is expected to provide fundamental knowledge about how stomata regulate photosynthesis and water use, with significant implications for modelling vegetation function and for improving the performance of crop plants.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Queensland University of Technology

DP150104001 Brereton, Prof Margot F; Roe, Prof Paul; Johnson, Dr Daniel M; Wyeth, Dr Peta A; Rogers, Prof Yvonne

2015 \$170,000.00

2016 \$163,000.00

2017 \$180,000.00

Total \$513,000.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation Queensland University of Technology

Project Summary

The 'Internet of Things' promises a future in which everyday things are all connected to the internet enabling them to share data and communicate with one another. The vision is technology-centric and things cannot be built by end users. This project aims to research how the 'Internet of Things' can be democratised: designed and built by everyone young and old, of different cultures and remote, with a domain focus on enabling social engagement and connectedness. People are expected to be able to connect through familiar objects such as their tables and kettles, and build interfaces themselves with intuitive building blocks. Anticipated project outcomes include new toolkits, new creative practices, a theoretical model and example networks of things connecting people in new ways.

DP150101402 Carpenter, Prof Belinda J; Tait, A/Prof Gordon; De Leo, Prof Diego; Tatz, Prof Colin

2015 \$41,566.00

2016 \$70,100.00

2017 \$45,931.00

Total \$157,597.00

Primary FoR 1801 LAW

Administering Organisation Queensland University of Technology

Project Summary

Data for suicide statistics can only come from official findings of suicide by a coroner, but this is a finding they are often reluctant to reach. The purpose of this project is to investigate how statistical calculations of suicide are dependent upon its coronial determination. The research is not only expected to result in more defensible national suicide data, it also aims to clarify the degree to which the recurrent 'problem' of suicide data may lie in the coronial construction of suicide itself. Expected benefits of the project include the clarification of the role of the coroners regarding suicide determination, and the more effective targeting of suicide prevention programs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104495 Ekberg, Dr Jenny A; Beagley, Prof Kenneth W; St John, Dr James A

2015	\$111,451.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$346,551.00

Primary FoR 1109 NEUROSCIENCES

Administering Organisation Queensland University of Technology

Project Summary

The project hypothesis is that the phagocytic activity of olfactory ensheathing cells (OECs) is the key factor that prevents bacteria from accessing the brain via the olfactory nerve, and allows continuous regeneration of the olfactory nervous system. This project aims to investigate how OECs phagocytose bacteria and debris from degenerating axons *in vivo*, and determine key molecular mechanisms in the process. Thus, we will characterise an unknown aspect of OEC biology that is neglected in the field. Intended outcomes include a paradigm shift that glial cells, and not circulatory immune cells, are the main defense against microbial invasion of the olfactory nerve. This is relevant for new therapies targeting neural infection/injury and antibiotic usage.

DP150100120 English, Prof Lyn D; Watson, Prof Jane M; Fitzallen, Dr Noleine E

2015	\$150,000.00
2016	\$143,900.00
2017	\$160,000.00
2018	\$150,000.00
Total	\$603,900.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation Queensland University of Technology

Project Summary

Improving the nation's skills in Science, Technology, Engineering, and Mathematics (STEM) remains a continuing concern, especially given the decline in international test results. The project aims to introduce a new approach to promoting this learning across grades 3-6 through modelling with data. With a focus on inquiry processes involving data variation and uncertainty within STEM-based contexts, the project aims to develop the important mathematical and statistical literacies needed for lifting student achievements. In advancing both theory and practice, the project aims to contribute to knowledge of primary students' capabilities for STEM problem solving and ways of enhancing implementation of the Australian Curriculum.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100234 Fairfull-Smith, Dr Kathryn E; Barner-Kowollik, Prof Dr Christopher; Barner, Dr Leonie; Hancock, Prof Robert E

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
2018	\$105,000.00
Total	\$445,300.00

Primary FoR 0303 MACROMOLECULAR AND MATERIALS CHEMISTRY

Administering Organisation Queensland University of Technology

Project Summary

Bacterial biofilms are a major problem in healthcare systems around the world as they cause persistent and chronic infections, including those associated with medical implants and cystic fibrosis. This project aims to develop new chemical approaches to deliver nitroxides at surface interfaces and in microparticles to facilitate long term control over biofilm growth. It is expected that these functionalised scaffolds will represent a breakthrough in the field and will have a profound impact by reducing infection rates associated with medical devices and improving airway clearance in cystic fibrosis patients.

DP150101022 Gable, Prof Guy G; Riemer, A/Prof Kai; Tate, Dr Mary; Bandara, Dr Wasana; Rai, Prof Arun

2015	\$214,383.00
2016	\$190,800.00
2017	\$203,394.00
Total	\$608,577.00

Primary FoR 0899 OTHER INFORMATION AND COMPUTING SCIENCES

Administering Organisation Queensland University of Technology

Project Summary

Behavioural research is a significant component of the annual spend in Australia on research and development. It is contended that 'best practice' behavioural research methods can be more systematised, transparent and visible; facilitating more complex, integrated and holistic research designs; and thereby, more cumulative and comparable results; thus enabling increased rigor, higher productivity and lower risk than have generally been the experience historically. This project proposes the formal conceptualisation and modelling of behavioural science research methods, by adapting them to the research design, the well understood concepts, tools and techniques of Information Systems design. Results are expected to form the conceptual basis of 'Research Design Systems.'

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100828 Gu, Prof Yuantong; Burrage, Prof Kevin; Oloyede, Prof Adekunle; Xiao, Prof Yin; Lim, Prof Chwee Teck

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0913 MECHANICAL ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

This project aims to develop a novel hierarchical multi-scale modelling framework to understand factors that influence the mechanical deformation behaviour of the extracellular matrix (ECM) such as cartilage, whose mechanical performance is critical to human wellbeing. Modelling ECM presents significant challenges due to the need to incorporate effects at scales from atomic interactions up to the fibre network in a continuum model. The proposed framework follows ECM's natural hierarchical structure and integrates efficient models for each key structural scale based on rigorous experimental validations. It is expected to provide a powerful tool for designing successful artificial ECM materials and understanding the mechanisms of the ECM degradation.

DP150101716 Hurn, Prof Aubrey S; Dungey, Prof Mardi H; Shi, Dr Shuping; Phillips, Dr Peter

2015	\$140,000.00
2016	\$124,700.00
2017	\$140,000.00
Total	\$404,700.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation Queensland University of Technology

Project Summary

Empirical measures of interconnectedness between financial institutions based on tests of Granger causality are currently used in detecting systemic risk. However, researchers need to define periods of calm and stress exogenously in order to implement these tests appropriately. This project aims to develop a new procedure to identify changes in causal relationships and the timing of these changes. The new approach has the potential to be a significant improvement in the real-time identification of emerging turmoil in financial markets and provide an improved method for the detection of systemic risk. The new test procedure will be implemented using data for financial and non-financial institutions across Europe, the US and Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103356 La Rosa, A/Prof Marcello; ter Hofstede, Prof Arthur H; Rosemann, Prof Dr Michael; Wynn, Dr Moe T; Ouyang, Dr Chun; Adams, Dr Michael J; van der Aalst, Prof Dr Wil M; Reijers, Prof Dr Hajo A; Dumas-Menjivar, Prof Marlon

2015 \$260,000.00

2016 \$277,700.00

2017 \$310,000.00

Total \$847,700.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation Queensland University of Technology

Project Summary

This project aims to develop an innovative approach to create and update as necessary the large collection of business process models that represent a complex organisation, so that this collection captures the actual way in which the organisation performs its business processes. Deploying theoretical, conceptual and empirical research, this project aims to capitalise on the value hidden in large process data, as recorded in event logs. The approach is intended to be implemented in an open-source technology to facilitate advanced investigations and predictions that can ultimately lead to better strategic decision-making. This technology also has the potential to become a research-enabling tool for the large research community in business process management.

DP150101828 Morawska, Prof Lidia; Dunbabin, Dr Matthew D; Mazaheri, Dr Mandana; Clifford, Dr Samuel; Knibbs, Dr Luke

2015 \$128,356.00

2016 \$99,800.00

2017 \$87,622.00

Total \$315,778.00

Primary FoR 0907 ENVIRONMENTAL ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

This interdisciplinary project aims to develop a personalised air pollution exposure monitoring system, leveraging the ubiquitousness and advancements in mobile phone technology and state of the art miniaturisation of monitoring sensors, data transmission and analysis. Airborne pollution is one of the top contemporary risks faced by humans; however, at present individuals have no way to recognise that they are at risk or need to protect themselves. It is expected that the outcome will empower individuals to control and minimise their own exposures. This is expected to lead to significant national socioeconomic benefits and bring global advancement in acquiring and utilising environmental information.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104659 Phillips, Dr Matthew J; Prentis, Dr Peter J

2015	\$150,000.00
2016	\$124,700.00
2017	\$118,000.00
Total	\$392,700.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation Queensland University of Technology

Project Summary

This project aims to use DNA, fossils and biological cues to synergistically model evolutionary rate changes. Molecular dates allow direct comparison of evolutionary and ecological patterns and processes across the tree of life. However, current models struggle to identify the location and magnitude of molecular clock rate changes on phylogenies, often resulting in wildly inaccurate dates. Expected outcomes include improved dating accuracy, and a novel statistical framework for morphological data, which allows fossils to be more accurately merged into the tree of life. In turn, the project aims to resolve intense debate on the origins of marsupial and placental mammals, and to trace the responses of these two groups to past environmental changes.

DP150100163 Recker, Prof Jan; vom Brocke, Prof Dr Jan; Seidel, Asst Prof Stefan

2015	\$130,000.00
2016	\$143,900.00
2017	\$122,000.00
Total	\$395,900.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation Queensland University of Technology

Project Summary

Reducing the environmental impact and increasing the environmental sustainability of organisations is a priority for Australia. Technology is meant to assist in this challenge, but knowledge is lacking about how information systems can meaningfully assist organisations in becoming sustainable. The goal of this project is to develop and test a theory of Green Information Systems, which describes design principles for information systems that allow organisations to engage in sustainability sense-making and implement sustainable practices. The outcomes are expected to assist in the development of systems to support sustainability initiatives, the management of sustainability programs, and the reduction of organisations' environmental footprint.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101649 Ristovski, Prof Zoran D; Keywood, Dr Melita D; Jones, A/Prof Graham B; Miljevic, Dr Branka; Schofield, Dr Robyn; Virtanen, Prof Annele; Modini, Dr Robin L; Harvey, Dr Michael J; Johnson, Dr Graham R; Cope, Dr Martin; Petaja, Prof Tuukka T

2015 \$83,000.00

2016 \$106,500.00

2017 \$74,000.00

Total \$263,500.00

Primary FoR 0401 ATMOSPHERIC SCIENCES

Administering Organisation Queensland University of Technology

Project Summary

Every cloud drop is formed from a microscopic aerosol particle, known as a cloud condensation nuclei (CCN). In unpolluted environments the CCN particles originate from biogenic sources. Determining the magnitude and driving factors of biogenic aerosol production in different ecosystems is crucial to the development and improvement of climate models. This project aims to determine the mechanisms of new particle production from one of the biggest ecosystems in Australia, the Great Barrier Reef. It is expected that the project will establish whether marine aerosol along the Queensland coast is coral-derived and show that this aerosol can affect the CCN concentration and therefore cloud formation and the hydrological cycle.

DP150100814 Thambiratnam, Prof David P; Dhanasekar, Prof Manicka; Sun, Dr Yan Q; Howie, Mr John A

2015 \$100,000.00

2016 \$105,500.00

2017 \$110,000.00

Total \$315,500.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

Ongoing increases in the number of level crossings and heavy road vehicles cause more frequent and severe level crossing accidents and derailments. Despite the use of active warning systems, each year, on average, 100 level crossing accidents occur in Australia. With a view to mitigating these crashes, this research aims to formulate theories for reduction in crash energy and effective wheel constraints to prevent derailment by modifying the levels of road and rail crossings and providing guard rails in the recesses of these modified level crossings. The theories are intended be developed using nonlinear dynamic computational methods and laboratory experiments. The outcomes are expected to enable reduction in the severity of level crossing accidents and hence save lives and costs of derailment.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103038 Tong, Prof Shilu; FitzGerald, Prof Gerard J; Guo, Dr Yuming; Jalaludin, Prof Dr Bin

2015	\$117,034.00
2016	\$83,500.00
2017	\$90,634.00
Total	\$291,168.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Queensland University of Technology

Project Summary

Climate change is increasingly recognised as this century's biggest global health threat, but the health consequences of climate change remain to be quantified. A typical example is health risks from heatwaves which kill more people than any other natural hazard in Australia, but few comprehensive datasets are available on what affects heatwaves can have on population health and well-being, and how such evidence can be translated into policy. This project aims to understand the health risks associated with heatwaves, to develop health risk-based metrics to define a heatwave across different areas, and to evaluate its implications for the development of social and health policies within an Australian context.

DP150103675 Turner, Prof Ian W; Burrage, Prof Kevin; Perre, Prof Patrick G

2015	\$114,000.00
2016	\$114,100.00
2017	\$119,000.00
Total	\$347,100.00

Primary FoR 0103 NUMERICAL AND COMPUTATIONAL MATHEMATICS

Administering Organisation Queensland University of Technology

Project Summary

This project aims to develop an innovative general framework to build multiphase porous media transport models directly from electron microscope images of the underlying microstructure. Leading edge experimental, computational and applied mathematical techniques are proposed to drive this novel approach of multiscale modelling, employable across numerous fields of science and engineering. The central project theme of developing an efficient and accurate multiscale model for simulating transport in heterogeneous porous media is expected to find application in the drying, timber and crop industries, and governmental agencies managing pollution in groundwater resources. This insight is likely to be invaluable for designing new industrial technologies and optimising current operations.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101240 Woods, A/Prof Annette F; Comber, Prof Barbara M; Kervin, A/Prof Lisa K

2015	\$100,000.00
2016	\$115,100.00
2017	\$100,000.00
Total	\$315,100.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation Queensland University of Technology

Project Summary

Contemporary literacy classrooms are places of intense curriculum and technological change. This project will investigate how young children are learning to write as they participate in producing both print and digital texts with a range of tools and technologies. Innovative approaches to teaching writing in early childhood classrooms in four schools situated in low socio-economic communities across two states will be collaboratively designed with teachers. The documentation of these classroom design experiments aims to form the basis of innovative practice for other teachers. Employing a socio-material analysis aims to illuminate the affordances of new ways of understanding learning to write in action, in contemporary early childhood classrooms.

DP150101717 Yan, A/Prof Cheng; Xi, Dr Yunfei; Zhang, Prof Guang-Ping

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation Queensland University of Technology

Project Summary

Vertically aligned titanium oxide (TiO_2) nanotube arrays have demonstrated remarkable properties for application in dyesensitised solar cell, photocatalysis, self-cleaning coating, purification of pollutants and orthopaedic implants. More excitingly, their architecture and dimensions can be precisely controlled using anodisation of titanium (Ti), creating considerable scientific interest and practical importance. This project aims to develop novel techniques for determining the mechanical behaviour of TiO_2 nanotube arrays and its dependence on crystal structure and geometrical parameters. The outcomes are expected to provide solutions to development of robust TiO_2 and other nanotube arrays for broad applications in sustainable energy and tissue engineering.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102110 Zhu, Prof Dr Huai-Yong; Zhao, Prof Dr Jin-Cai

2015	\$180,000.00
2016	\$143,900.00
2017	\$150,000.00
2018	\$100,000.00
2019	\$100,000.00
Total	\$673,900.00

Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

Administering Organisation Queensland University of Technology

Project Summary

This project aims to develop photocatalysis of supported metal nanoparticles to drive various chemical synthesis reactions at moderate temperatures using sunlight. The nanostructures of plasmonic metals (gold, silver and copper) are used as light absorbers to concentrate the energy of incident light and generate intense electromagnetic field, which are utilised to promote the catalytic reactions on transition metals in the photocatalysts. The mechanisms of these new photocatalytic processes will be defined. Successful completion of this project will result in new strategies for catalytic chemical synthesis and valuable knowledge within the areas of catalysis, conversion of solar energy to chemical energy, and nanomaterials.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Queensland

DP150103425 Abbosh, A/Prof Amin M; Crozier, Prof Stuart

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

The aim of this project is the design and development of a low-cost, non-ionising, and non-invasive microwave technology that can be used to diagnose and localise early brain injuries of premature newborn babies. It proposes to include a switched antenna array and wide-band microwave transceiver. The system aims to use a combination of compressed sensing and differential imaging techniques to produce, within a few seconds, microwave images of the brain making it a real-time monitoring tool. By providing vital information about the brain at the incubator side, the proposed compact technology would avoid the risky move of critically ill babies to the expensive and bulky conventional scanners which, furthermore, cannot operate as frequent monitoring tools.

DP150103614 Abbosh, A/Prof Amin M; Eleftheriades, Prof George V; Antoniades, Dr Marco

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The University of Queensland

Project Summary

The aim of this project is the design and development of a portable microwave imaging system to investigate the viability of microwave techniques for early heart failure detection. It will employ conformal antenna arrays integrated with compact reconfigurable radar to obtain super-resolution images that enable the early detection of heart failure. Because of its low-cost, non-ionising and non-invasive properties, it can be used frequently for real-time monitoring, thus providing a significant advantage over conventional imaging equipment and hence paving the way for its broader applications. Moreover, portability of the technology is expected to enable its use for self-monitoring, leading to a significant reduction in health care costs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104766 Alati, A/Prof Rosa; Williams, Prof Gail M; Najman, Prof Jakob M; Mamun, A/Prof Abdullah A; Clavarino, Asst Prof Alexandra M

2015	\$90,000.00
2016	\$88,200.00
2017	\$95,000.00
Total	\$273,200.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

The aim of this project is to investigate the social contexts, roles and consequences of problematic alcohol use in adults aged 30, using long term longitudinal resources able to observe the development and corollary of alcohol use over time. It is posited that such drinkers entering their third decade of life persist in levels of problematic alcohol use typically associated with younger ages and that this leads to social consequences, such as gender specific risks, relationship conflicts and more severe long term effects. Outcomes from this project are expected to inform the generation of relevant prevention and intervention strategies aimed to address problem drinking in adult Australians.

DP150100936 Alexandrov, Prof Kirill

2015	\$175,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$105,000.00
Total	\$534,700.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project proposes a generic approach for the construction of molecular switches based on artificially autoinhibited proteases. The bottom-up design of protein-based signaling networks is a key goal of synthetic biology. Yet, this remains elusive due to our inability to tailor-make signal transducers and receptors that can be readily compiled into defined signaling networks. Using structure-guided design and directed protein evolution, a set of protease-based signal transducers and ligand activated allosteric receptors will be created. The developed components are intended to be used to construct artificial signaling networks in mammalian cells that are orthogonal to the endogenous signaling cascades.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101782 Asgari, A/Prof Sassan

2015	\$109,000.00
2016	\$105,500.00
2017	\$111,000.00
Total	\$325,500.00

Primary FoR 0608 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to determine the role of small non-coding RNAs in mosquito-Wolbachia interactions, including Wolbachia microRNAs, concentrating on exchanged microRNAs between the two organisms and explore microRNAs effect on Wolbachia maintenance and its anti-viral property. Small non-coding RNAs play significant roles in various biological processes, including host-microorganism interactions. Recent evidence suggests that small RNAs can be exchanged between microorganisms and their hosts and regulate gene expression in the other organism. The endosymbiotic bacterium, Wolbachia, has attracted worldwide attention due to inhibiting replication of various vector-borne pathogens in mosquito vectors.

DP150101808 Ashkanasy, Prof Neal M; Bennett, Prof Rebecca; Martinko, Em/Prof Mark J

2015	\$65,000.00
2016	\$67,100.00
2017	\$65,000.00
Total	\$197,100.00

Primary FoR 1503 BUSINESS AND MANAGEMENT

Administering Organisation The University of Queensland

Project Summary

Employees in both public and private sector organisations are today being urged to do more with less. Consequently work team supervisors are under pressure to demand more effort from subordinates. But when does this cross the line to become abusive supervision? This project proposes to develop and test a framework intended to explain, from an employee's perspective, how supervisors can motivate their subordinates to perform and at the same time avoid being seen as abusive. The project includes three studies whose results aim to have both theoretical and practical implications, and in particular to help supervisors to understand their subordinates' behaviours, leading to improved employee wellbeing and organisational productivity.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103345 Bernhardt, Prof Paul V

2015	\$108,556.00
2016	\$102,700.00
2017	\$108,556.00
Total	\$319,812.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The ways that redox enzymes communicate with an electrochemical electrode are poorly understood and most systems rely on small molecule mediators as electron shuttles to complete the circuit. The few examples where direct (unmediated) enzyme electrochemistry has been achieved have relied on empirical experimental approaches in electrode modification. In this project a rational approach will be taken, starting with a mediated enzyme electrochemical system which is then systematically deconstructed to produce a minimal enzyme-electrode that is stabilised by non-covalent forces and functions without a mediator. This rational approach will provide new routes to the direct enzyme electrochemistry of other enzyme systems as yet unexplored.

DP150104672 Bernhardt, Prof Paul V

2015	\$105,056.00
2016	\$100,300.00
2017	\$103,056.00
Total	\$308,412.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

Copper (Cu) complexes of poly-amine ligands have emerged as extremely active homogeneous catalysts in atom transfer radical reactions, forming organic radicals from alkyl halide precursors, and they are now employed extensively in polymer and organic chemistry. The catalyst cycles between its Cu(I) and Cu(II) oxidation states reversibly yet both forms are susceptible to side reactions, particularly with solvents which can lead to loss of catalytic activity. This project aims to apply a multifaceted approach to interrogate the catalysts in both their Cu(I) and Cu(II) oxidation states and identify for the first time the pathways that lead to undesirable side reactions and provide new ways of optimising catalyst performance.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102086 Beveridge, Prof Christine A; Hanan, A/Prof James S; Tanurdzic, Dr Milos; Lunn, Dr John E

2015	\$140,000.00
2016	\$124,700.00
2017	\$122,000.00
Total	\$386,700.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Queensland

Project Summary

For centuries, people around the world have made use of the knowledge that pruning the growing tips of shoots causes buds on the stem below to grow out into branches. Yields in crop, horticulture and forestry industries depend on shoot architecture. Since the discovery of auxin in the 1930s, shoot branching has been thought to be regulated by plant hormones. However, in this project we propose a new theory whereby shoot tip demand for sugar is predominant in apical dominance; enhanced sucrose, a mobile sugar, is necessary and sufficient for the initial growth of buds. This project aims to expand this theory, revealing underlying components involved in sucrose action and describe how the network of sugar demand and hormones acts to control shoot architecture.

DP150101996 Bhatia, Prof Suresh K; Smart, Dr Simon K; Kapteijn, Prof Dr Frederik; Nair, A/Prof Sankar

2015	\$141,000.00
2016	\$122,800.00
2017	\$130,000.00
Total	\$393,800.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project aims to develop next generation models of permeation in mixed matrix membranes by targeting the effects of isotherm nonlinearity, and its interplay with filler particle size and its distribution, and thereby provide the platform for achieving breakthroughs in separation processes based on such membranes. With this platform, improved performance of mixed matrix membranes for key industrially important separations is expected to be achieved, using novel filler/polymer combinations and by developing a broad, widely applicable, protocol for the tailoring of their interface. These advances are anticipated not only to transform the ways in which membranes are designed and optimised, but also to apply to transport in dispersion-based composites in general.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101824 Bhatia, Prof Suresh K; Nicholson, Prof David; Kaerger, Prof Dr Joerg; Haase, Prof Juergen

2015	\$100,000.00
2016	\$115,100.00
2017	\$116,000.00
2018	\$116,000.00
2019	\$90,000.00
Total	\$537,100.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project aims to make ground-breaking advances in the modelling of transport in disordered nanoporous materials by uncovering the interfacial barriers that are critical to the entry and exit of molecules from their nanostructure. The expected outcome is an efficient new simulation tool to simultaneously quantify interfacial transport resistances and system size-dependent internal transport coefficients. This is intended to be achieved through simulations and experiments on the adsorption and dynamics of targeted gases in carbons with distinctly different nanostructures, enabling the optimal design of a wide range of emerging nanotechnologies for membrane separations, kinetic molecular sieving, catalysis, and gas and electrochemical energy storage.

DP150101841 Blows, Prof Mark W

2015	\$105,000.00
2016	\$163,000.00
2017	\$105,000.00
2018	\$105,000.00
2019	\$170,000.00
Total	\$648,000.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to determine why nearly-null genetic subspaces exist by simultaneously measuring the input of new mutational variance in these nearly-null subspaces and the selection that acts on these new mutations to result in the observed low levels of standing genetic variance. The ability of organisms to evolve in response to human disturbance, translocation to new environments, or climate variation is governed by the availability of genetic variation. Recent advances in multivariate genetic analysis have demonstrated that a substantial proportion of a phenotype described by quantitative traits has very little genetic variance associated with it, and will therefore tend to be subjected to evolutionary limits

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100414 Broom, A/Prof Alexander F; Kirby, Dr Emma; Yates, Prof Patsy; Seale, Prof Clive; Oliffe, Prof John L

2015	\$114,000.00
2016	\$123,700.00
2017	\$122,000.00
Total	\$359,700.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

Despite being the leading burden of disease confronting Australia, cancer is not well understood in terms of its multifaceted, complex and evolving impacts on individuals, families and communities. Surviving cancer is often not only about seeking cure but rather finding ways of living with it, presenting new and important challenges for individuals and their significant others. This project will examine the meanings and practice of 'cancer survivorship' through the lives of Australian's currently living with cancer. This project aims to advance a broad evidence-base for policy, practice and engagement nationally and internationally.

DP150100530 Bryant, Prof Darryn E

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
2018	\$80,000.00
Total	\$316,700.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Queensland

Project Summary

Graph factorisation is an active area of research in combinatorial mathematics that is driven both by theoretical questions and by new and varied applications, particularly in digital communication and information technologies. The aim of this project is to solve the Oberwolfach Problem: a fundamental and historically significant graph factorisation question that has intrigued researchers for decades. Building on recent breakthroughs, new and widely applicable graph factorisation techniques are intended to be developed. The project outcomes are expected to have ongoing influence and impact on research in the field.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104108 Burton, A/Prof Benjamin A; Spreer, Dr Jonathan

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Queensland

Project Summary

Computational topology is a young and energetic field that uses computers to solve complex geometric problems driven by pure mathematics, and with diverse applications in biology, signal processing and data mining. A major barrier is that many of these problems are thought to be fundamentally and intractably hard. This project aims to defy such barriers for typical real-world inputs by fusing geometric techniques with technologies from the field of parameterised complexity, creating powerful, practical solutions for these problems. It is expected to shed much-needed light on the vast and puzzling gap between theory and practice, and give researchers fast new software tools for large-scale experimentation and cutting-edge computer proofs.

DP150104048 Carroll, Prof Bernard J; Kazan, Dr Kemal; Jackson, Prof David

2015	\$125,000.00
2016	\$115,100.00
2017	\$115,000.00
Total	\$355,100.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Gene silencing is a highly conserved process in plants and animals. It is of fundamental importance to gene regulation, virus defence, genome response to environment, and genome evolution. Remarkably, when gene silencing is triggered in plants it can spread throughout the organism. The aim of this project is to define the mechanism of intercellular movement of gene silencing in plants, and its relevance to plant growth and defence against pathogens. Expected outcomes include increased understanding of intercellular genetic signalling in plants and its role in plant growth and disease resistance. The findings may also shed new light on mechanisms of gene silencing in animals.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100056 Chen, Dr Zhigang; Drennan, Prof John; Snyder, Dr Gerald J

2015	\$110,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$305,900.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The University of Queensland

Project Summary

The direct energy conversion between heat and electricity, based on thermoelectric effects without moving parts, has been considered as a green and sustainable solution to the global energy dilemma. This project aims to develop novel band-engineered (Bi, Sb)2Te3 nanomaterials for high-efficiency energy conversion using novel microwave assisted wet chemistry approach, coupled with nanostructure and band engineering strategies. The key breakthrough is to design high performance (Bi, Sb)2Te3 thermoelectrics for satisfying the high efficiency solid-state devices. The expected outcomes will lead to an innovative technology that waste heat recovery and refrigeration, which will place Australia at the forefront of practical energy technologies.

DP150102710 Cheney, Dr Karen L; Marshall, Prof Justin N; Endler, Prof John A; Vorobyev, Dr Misha (Mikhail); Osorio, Prof Daniel

2015	\$232,000.00
2016	\$121,800.00
2017	\$144,000.00
Total	\$497,800.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Queensland

Project Summary

Red apples in green trees and blue berries on the ground create very different visual signals to animals. Furthermore, elaborate animal colour patterns have evolved to render them conspicuous or camouflaged against their background. Despite the ecological and evolutionary importance of animal colour patterns, little is known about how larger colour contrasts and complex patterns are perceived by animals. This project aims to fill this knowledge gap specifically it endeavours: to provide useful tools for behavioural ecologists and visual neuroscientists, and to understand for the first time the full gamut of colour signalling in both terrestrial and aquatic environments.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100093 Chenoweth, Dr Stephen F

2015	\$124,868.00
2016	\$132,300.00
2017	\$117,485.00
Total	\$374,653.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Using powerful genomic technology this project aims to assess the strength of regulatory constraints between males and females and determine whether cis-regulatory mutations help to resolve them. Sex-differences in traits like morphology, behaviour and disease susceptibility often involve sex-differences in the regulation of gene expression. To achieve optimal performance, males and females must express their genes at different levels. Theory and data suggest that for some genes this is not possible, and that males and females could each achieve higher performance if gene regulation became genetically uncoupled between them. It has been suggested that cis-regulatory mutations may be important for resolving regulatory incompatibilities within the genome.

DP150100457 Cheshire, A/Prof Lynda A; Fitzgerald, Dr Robin T

2015	\$30,000.00
2016	\$102,600.00
2017	\$50,000.00
Total	\$182,600.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

Neighbourliness - that is, positive relations between neighbours - brings significant social benefits that are well known. Yet neighbours can also be a major source of nuisance, conflict and stress. Very little is known about the negative side of neighbouring and no research has been conducted on its nature, causes and outcomes. This project examines un-neighbourliness as an empirical and sociological problem in four suburban contexts. It is significant in that it aims to: identify the factors that undermine neighbourliness and inform policies to address those factors; assist relevant agencies in managing neighbour problems; and advance understanding about good - and bad - neighbouring in contemporary suburban life.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100505 Collins, Dr Brett M; Parton, Prof Robert G

2015	\$128,000.00
2016	\$121,800.00
2017	\$130,000.00
2018	\$128,000.00
Total	\$507,800.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Caveolae are small invaginations of the plasma membrane and are a characteristic feature of eukaryotic cells. Described morphologically in the early 1950s their many important functions are only just beginning to be revealed. Caveolae are multifunctional organelles that play a vital role in normal cellular processes such as signalling and membrane homeostasis, and are perturbed in cancer, lipid storage and muscle diseases. A new family of coat proteins called cavins have recently been discovered. Cavins are essential for the formation of caveolae, and this project seeks to understand how these multiprotein complexes are assembled at the membrane interface and control caveola function at the molecular level.

DP150102135 Collins, Dr Denis B; Stoessel, Dr Jason J

2015	\$52,000.00
2016	\$30,000.00
2017	\$35,000.00
Total	\$117,000.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The University of Queensland

Project Summary

This project aims to reconceptualise current understandings of musical composition from circa 1330 to circa 1530. Employing innovative computational tools, it aims to show for the first time the specific techniques that composers employed to create different kinds of musical canons. The resulting monograph will seek to make a substantive and original contribution to the history of compositional practice and demonstrate the fundamental role played by canonic techniques in broader sociocultural functions and uses of music.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101293 Corcoran, A/Prof Jonathan J; Wickes, Dr Rebecca L; Hipp, Prof John R

2015	\$106,392.00
2016	\$84,800.00
2017	\$103,945.00
Total	\$295,137.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation The University of Queensland

Project Summary

Neighbourhoods are critical contexts for health, safety and well-being. In the face of significant urban growth, understanding and enhancing neighbourhood networks and cohesion are high priorities in Australia and internationally. Drawing on longitudinal survey data from 148 Brisbane suburbs combined with census and spatial data, this project will be the first to examine how a neighbourhood's physical and socio-structural context influences neighbourhood networks and cohesion over time and across the landscape of an entire city. The project aims to advance scientific understanding of neighbourhood networks and cohesion, provide unique insights into its underpinning drivers, and inform urban policy.

DP150100443 Craik, Prof David J; Durek, Dr Thomas; Gilding, Dr Edward K; Ploegh, Prof Dr Hidde L

2015	\$145,000.00
2016	\$139,100.00
2017	\$135,000.00
2018	\$120,000.00
2019	\$120,000.00
Total	\$659,100.00

Primary FoR 0304 MEDICINAL AND BIOMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

This project aims to develop plant-derived ultra-stable cyclic peptides for pharmaceutical and agricultural applications. The project will use innovative new methodologies for discovery, chemical synthesis and engineering of these molecules. It is expected that the project will contribute to high value biotechnology and agricultural industries in Australia. The proposed outcomes will include fundamental new knowledge on the biosynthesis of circular proteins in plants, new approaches for their discovery and technologies for applying them as drug leads and agricultural products.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102354 Dao, Dr Vinh T; Torero Cullen, Prof Jose L; Ho, Dr Johnny C; O'Moore, Dr Liza M; Bisby, Prof Dr Luke A

2015	\$110,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$286,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Thermal loading experienced by concrete samples in conventional tests cannot be accurately and independently controlled. This project, through using a novel thermal loading technique, aims to re-examine the performance of concrete in fire. By establishing the heat-flux as a parameter of study, concrete performance under a wide range of fire conditions is expected to be better quantified, eventually leading to a reliable performance-based design of concrete structures. Expected outcomes include improved understanding of concrete performance under combined fire and other loadings, appropriate mathematical models for fundamental concrete properties and constitutive relations, and design recommendations for concrete performance under real fire exposures.

DP150103997 de Zubicaray, A/Prof Greig I; McMahon, Dr Katie L; Meinzer, A/Prof Marcus

2015	\$90,000.00
2016	\$86,300.00
2017	\$110,000.00
Total	\$286,300.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of Queensland

Project Summary

While humans produce speech fluently in the course of everyday conversation, comparatively little is understood about the underlying mental processes and brain mechanisms. The overall aim of this project is to investigate how the human brain conceives and controls speech output by using state-of-the-art neuroimaging and brain stimulation techniques. The research aims to contribute novel insights into a key human ability with particular relevance for speech disorders such as aphasia, while the methods developed for brain stimulation during imaging of speech production aim to expand Australia's capability and technical innovation in the cognitive neuroscience of language.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104609 Fairlie, Prof David P

2015	\$170,000.00
2016	\$163,000.00
2017	\$170,000.00
Total	\$503,000.00

Primary FoR 0304 MEDICINAL AND BIOMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The 21st century has become the age of injectable peptide therapeutics. To fully realise their benefits , peptide drugs need to become smaller, cheaper and orally deliverable. Proteins often exhibit potent and selective biological actions through small peptide surfaces. These surfaces have been mimicked in cyclic peptides that are similarly potent and selective. However, cyclic peptides do not have the right properties to be oral drugs. This project aims to re-engineer their surfaces to survive potential degradation in the gut, to permeate membranes and to withstand clearance from blood. The projected outcome of this project is new information and technology for downsizing proteins to small orally bioavailable peptides for therapeutic applications.

DP150101033 Fedorov, Dr Arkady

2015	\$150,000.00
2016	\$163,000.00
2017	\$150,000.00
2018	\$150,000.00
Total	\$613,000.00

Primary FoR 0206 QUANTUM PHYSICS

Administering Organisation The University of Queensland

Project Summary

Superconducting circuits have great potential for probing and using quantum nature on a chip but lack networking capabilities between remote sites. However, non-local quantum correlations are critical for quantum devices to surpass classical systems. This project aims to create capabilities for establishing entanglement between remote superconducting chips using non-local dissipative interaction. Within this approach the created entanglement can be also preserved as long as necessary as a resource for quantum protocols. The resulting technology is expected to enable quantum information processing in superconducting circuits on fundamentally larger scales and provides a powerful platform to test the limits for building artificial quantum systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100569 Fitzgerald, Dr Robin T; Cherney, Dr Adrian; Bartels, Dr Lorana; Warner, Prof Catherine A

2015 \$96,166.00

2016 \$72,600.00

2017 \$67,014.00

Total \$235,780.00

Primary FoR 1801 LAW

Administering Organisation The University of Queensland

Project Summary

Serious crimes committed by parolees in Australia have brought parole into the public eye. Without concrete evidence, governments often act on the assumption that the public holds punitive attitudes. This project is expected to develop an evidence base to inform policy on parole at a crucial time when governments are under pressure to restrict its use. Three mixed-method studies aim to assess: what public views on parole are; why the public holds these views; and what influence these views have on policy and practice. The project is expected to make contributions to: creating information strategies that properly inform the public; supporting prisoner reintegration strategies; and shaping criminal justice policies based on informed community feedback.

DP150101571 Franklin, Prof Craig E

2015 \$207,000.00

2016 \$126,600.00

2017 \$133,000.00

Total \$466,600.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to investigate tolerance to low pH freshwaters, focusing on the mechanisms that underpin acid tolerance, physiological plasticity, the interactions between low pH and other environmental variables (e.g. temperature), and the costs and/or trade-offs to living in such physiologically challenging environments. Low pH waters are toxic to most animals, yet some freshwater vertebrates have managed to colonise some of the lowest pH environments on Earth. In our rapidly changing world, this study is expected to provide an important fundamental understanding of the capacity of some organisms to flourish at environmental extremes and their ability to respond to increased variability both within and between environmental stressors.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100268 Freguia, Dr Stefano; Dexter, Dr Annette F; Virdis, Dr Bernardino; Laycock, Dr Bronwyn G

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Some bacteria possess a natural conductive tail constructed from proteins (called a nanowire) that has metal-like conductivity. The electrical signals in these nanowires are carried through aromatic groups in the peptides and/or attached cytochromes. This project addresses the design and assembly of conducting peptide-based fibrils inspired by these nanowires. It has already been shown that peptides can, by design, self-assemble into long thermostable fibrils that support cell growth and development. The project's goal is now to create cost-effective, non-toxic, conducting peptide fibrils that can be used in water or physiological environments for bioelectronics applications.

DP150101152 Goodhill, Prof Geoffrey J

2015	\$143,000.00
2016	\$140,000.00
2017	\$156,000.00
Total	\$439,000.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Queensland

Project Summary

Information about the world is represented in the brain by the combined activity of populations of many neurons. However, the basic principles underlying how such population activity codes information are largely unknown. Using the map from the eye to the brain of the zebrafish as a model, the project aims to combine experimental measurements of neural activity with mathematical modelling in order to discover these basic principles. Of particular interest is how these coding principles change during development and their plasticity after disruptions to the visual map. Besides improving our understanding of how brains process information, the knowledge gained could help optimise the design of brain-computer interfaces and artificial computing devices.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100740 Hankamer, Prof Benjamin D; Happe, Prof Dr Thomas

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Queensland

Project Summary

The project aims to bio-engineer high-efficiency microalgae cell-lines that can drive solar powered H₂ production from water. It plans to do so by increasing proton and electron supply to the H₂-producing hydrogenase. It builds on patented cell lines that have enhanced light capture efficiency and H₂ production capabilities. The aim of this project is to increase the efficiency of the last stage of the process (three fold) in a major step in developing economic solar-fuel systems. National benefits include the development of advanced microalgae fuels systems to increase future fuel security, reduce CO₂ emissions and assist with regional development.

DP150100302 Henry, A/Prof Julie D; Phillips, Prof Louise H

2015	\$90,000.00
2016	\$86,300.00
2017	\$80,000.00
Total	\$256,300.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Social perception refers broadly to the ability to decode and react appropriately to the social signals sent out by other people, and is a critical predictor of social competency and wellbeing. The aim of this project is to gain a clearer picture of when and why older adults experience social perceptual difficulties, as well as any consequences of these difficulties. A key prediction is that those older adults who have most difficulty with social perception will also have lowest wellbeing. Identifying which older adults are most likely to experience social perceptual difficulties, as well as which aspects of social perception are relatively intact, are expected to help to guide interventions on how to maintain wellbeing in old age.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100137 Henry, Prof Robert J

2015	\$135,000.00
2016	\$131,400.00
2017	\$137,000.00
Total	\$403,400.00

Primary FoR 0703 CROP AND PASTURE PRODUCTION

Administering Organisation The University of Queensland

Project Summary

Wild relatives of rice are found across northern Australia. The project aims to apply emerging technologies for efficient whole genome sequencing to determination of the genetic diversity of these populations in relation to cultivated rice and wild rice from other parts of the world. The role of the Australian populations in the evolution of rice and the potential of these populations to contribute valuable diversity to rice crops worldwide are intended to be analysed. The impact of domestication on rice in Asia is expected to be established by the characterisation of the related Australian populations that were isolated from the impacts of agriculture for around 7000 years. Whole genome associations with environment may provide clues to adapting agriculture to climate.

DP150103110 Hogan, Dr Benjamin M; Harvey, A/Prof Natasha L

2015	\$124,000.00
2016	\$121,800.00
2017	\$130,000.00
Total	\$375,800.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Queensland

Project Summary

Vascular system development is one of the earliest events that occurs in the embryo. The entire lymphatic vascular system forms from the embryo's early veins. This project aims to define the earliest molecular and cellular changes essential to form an entire second vessel network from just a few precursor cells in the embryo. The project aims to utilise zebrafish and mouse embryos to greatly expand knowledge in the formation of this essential vertebrate tissue. Ultimately, this is expected to provide new knowledge in stem and precursor cell differentiation, the evolution of complex organ systems and tissue formation. Outcomes may impact on future biotechnology in the areas of tissues engineering, stem cell differentiation and regeneration.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104119 Hogan, Dr Benjamin M; Yap, Prof Alpha S

2015	\$121,000.00
2016	\$118,900.00
2017	\$128,000.00
2018	\$77,000.00
Total	\$444,900.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Queensland

Project Summary

This project aims to utilize groundbreaking new approaches to visualize cell-cell adhesive forces in vascular development. Vascular system development is one of the earliest events in the vertebrate embryo. It has long been established that one major contributor to the formation of new vessels is physical force, which can be generated through blood flow or cell-cell interactions during tissue morphogenesis. The project plan utilizes live imaging in zebrafish and a new generation of biosensors to gain a vastly deeper understanding of how force controls vessel formation.

DP150101275 Hong, Dr Min-Chun

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Queensland

Project Summary

This project aims to address important problems key to the understanding of geometric evolution equations and certain other nonlinear partial differential equations. The problems to be tackled lie in a very active area of mathematics: harmonic maps, liquid crystals and Yang-Mills theory. Special aims are to exploit new methods to settle open problems in harmonic maps and Yang-Mills equations, and to improve understanding of practical questions such as the mathematical modelling of liquid crystals via the celebrated Ericksen-Leslie and Landau-de Gennes theories. The expected outcomes are fundamental results in mathematics, with applications in other sciences.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102539 Hornsey, Prof Matthew J; Fielding, Dr Kelly

2015	\$65,000.00
2016	\$62,300.00
2017	\$65,000.00
Total	\$192,300.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Many people hold beliefs that defy scientific consensus. A standard response when a scientist faces resistance to an evidence-based message is to keep explaining the evidence as clearly and thoroughly as possible (explication). It is argued that explication often fails because people are motivated to hold on to non-scientific beliefs for reasons other than the motivation to find the truth. It is proposed that qualitative and quantitative techniques to identify these hidden motivations. These insights will be used to test psychologically tailored interventions designed to interrupt or circumnavigate these underlying motives, with the goal of promoting environmental responsibility and population health.

DP150104202 Hugenholtz, Prof Philip; Morrison, Prof Mark; Sicheritz-Ponten, Prof Thomas; Moeller, Prof Birger L

2015	\$120,000.00
2016	\$134,300.00
2017	\$120,000.00
Total	\$374,300.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation The University of Queensland

Project Summary

Eucalyptus leaves comprise all or part of the diet of some marsupials including koalas. Gut microbiota assist in the ability of these folivores to tolerate eucalyptus toxins although present understanding of this process is rudimentary. This project aims to use culture-independent molecular methods to identify and characterise gut populations involved in phytochemical detoxification by comparative analysis with diprotodont relatives that are not capable of digesting eucalyptus leaves. This will highlight evolutionary convergence of gut microbiomes in toxic folivores and reveal mechanisms by which microorganisms respond to and metabolise eucalypt toxins. A broader evolutionary context of marsupial digestive function will assist in ongoing conservation efforts.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102120 Koopman, Prof Peter A

2015	\$147,000.00
2016	\$148,600.00
2017	\$162,000.00
Total	\$457,600.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Queensland

Project Summary

Development as a male or female is one of the most important biological decisions made during embryonic life. Although several of the key sex-determining genes are now known, it is unclear how they come to be active at the right time and in the right cells of the gonad to direct sex determination. This project aims to use bioinformatics, biochemistry, cellular assays and powerful genome editing technologies in mice to pinpoint essential regulatory elements and understand how they function. In addition to addressing key issues in mammalian molecular genetics and developmental biology, data generated in this project may provide a basis for innovative biotechnologies in pest management, wildlife conservation and livestock breeding.

DP150102420 LaCaze, Dr Marguerite M

2015	\$50,000.00
2016	\$48,000.00
2017	\$50,000.00
Total	\$148,000.00

Primary FoR 2203 PHILOSOPHY

Administering Organisation The University of Queensland

Project Summary

Contemporary political ethics has to face the question of how to repair relations that have broken down after crimes, oppression and political violence. Using the work of European and feminist philosophers to examine historical and recent cases including post-liberation France, post-genocide Rwanda and post-colonial Australasia and neighbouring countries, this project aims to develop a philosophical account of ethical restoration, focusing on just punishment, forgiveness, reconciliation, building trust and atonement.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103060 Lant, Prof Paul A; Tyson, A/Prof Gene W; Pratt, Dr Steven; Jensen, Dr Paul D; Chen, Prof Dr Guo-Qiang G

2015	\$150,000.00
2016	\$134,300.00
2017	\$130,000.00
Total	\$414,300.00

Primary FoR 0907 ENVIRONMENTAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The aim of this project is to produce high performance biodegradable polymers directly from methane. The key innovation is employing cutting-edge community genomic and transcriptomic approaches to characterise intracellular production lines in order to tailor polyhydroxybutyrate-co-valerate (PHBV) copolymer microstructures. This is a truly multidisciplinary project bringing together engineers, polymer scientists and molecular biologists. It is expected that a direct outcome of the project will be the first PHBV copolymer from methane. As such, the project aims to develop technology for the production of tough, flexible and affordable biopolymers and, at the same time, provide an opportunity to add value to methane.

DP150102098 Lingard, Prof Robert L; Gulson, Dr Kalervo N; Sellar, Dr Sam R; Takayama, Dr Keita; Lubienski, Prof Christopher; Webb, A/Prof Philip T

2015	\$68,000.00
2016	\$134,300.00
2017	\$66,842.00
2018	\$30,000.00
Total	\$299,142.00

Primary FoR 1303 SPECIALIST STUDIES IN EDUCATION

Administering Organisation The University of Queensland

Project Summary

Multiple data sets now drive education systems and schools. This project aims to investigate the role of data infrastructures in education policy, in schools, systems, nations and globally. The project will examine four related policy contexts in the Asia-Pacific region (Australia, Canada, Japan, and the United States of America) and the data mobilities flowing from the release of Programme for International Student Assessment (PISA) 2015. New knowledge is expected to be developed on the concepts of data infrastructure and data mobility; how data create new spatialised modes of educational governance; and how relations between governments, Non-Government Organisations and corporations are reconfigured through data use. The project is expected to provide new evidence on how educational data affect education governance, policy making and policy enactment across geographical scales.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101294 Links, A/Prof Jon R; Isaac, Dr Phillip S; Foerster, A/Prof Angela

2015	\$85,000.00
2016	\$81,500.00
2017	\$85,000.00
Total	\$251,500.00

Primary FoR 0105 MATHEMATICAL PHYSICS

Administering Organisation The University of Queensland

Project Summary

Richardson-Gaudin systems form a class of mathematical models of interacting particles that serve as a foundation to understand important phenomena in modern physics. Being integrable, these quantum systems enable deep insights. They are tractable so as to allow for exact analysis, while being elaborate enough to exhibit complex physical properties, notably phase transitions. The international team of researchers aims to merge various approaches for analysing the integrability of such models. Successful outcomes are expected to produce inventive mathematical techniques, linking a diverse range of fields of current activity and growth. The resulting unified theory is expected to open the door to exciting and innovative pathways in mathematical physics research.

DP150102428 Lynch, Prof Joseph W

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$369,900.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

By regulating the strength of synaptic transmission between neurons, zinc exerts dynamic control over many physiological processes including memory formation, fear conditioning and movement control. Zinc also controls neuronal cell death pathways. There is currently much controversy about the concentration that zinc reaches in the synaptic cleft and the length of time it remains elevated. By defining these parameters, this project aims to understand which proteins zinc acts upon and the molecular mechanisms by which it exerts its synapse-modulating effects. The outcomes of this project could lead to better understanding of zinc dynamics that could underpin future research into many physiological processes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101097 **Mark, Prof Alan E; Geerke, Asst Prof Daan P; Klau, Prof Gunnar**

2015	\$122,000.00
2016	\$117,000.00
2017	\$115,000.00
Total	\$354,000.00

Primary FoR 0304 MEDICINAL AND BIOMOLECULAR CHEMISTRY

Administering Organisation The University of Queensland

Project Summary

The ability to model molecular systems at an atomic level, as used in protein structure refinement or computational drug design, is critically dependent on the accuracy with which inter-atomic interactions are represented. Highly optimised and well-validated interaction parameters are available for common biomolecules, such as amino acids, sugars and lipids, but not for co-factors, substrates and potential drug molecules, or other molecules of interest such as polymers and dendrimers. The aim of this project is to develop and validate geometric and interaction parameters (force fields) for complex organic molecules and use these to facilitate bio-molecular structure refinement and computational drug design.

DP150101846 **Martin, Prof Darren J; McFarland, Prof Eric W; Fox, A/Prof Bronwyn L; Annamalai, Dr Pratheep Kumar; Laycock, Dr Bronwyn G**

2015	\$120,000.00
2016	\$105,500.00
2017	\$120,000.00
Total	\$345,500.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Spinifex grasses cover approximately 30 per cent of our Australian continent, in the driest regions. It has been found that, presumably because of this harsh environment, they are uniquely easy to break down into ultra-long, thin cellulose nanofibrils. Through the use of novel catalysts and advanced processing techniques, this project aims to take advantage of this trait to deliver the cost-effective production of high strength, sustainable carbon fibres from nanocellulose. It is expected that the use of the world's first university based research facility capable of producing high quality carbon fibre (CarbonNexus) will ensure the product is industrially relevant, with real potential to capture a share of the \$14 billion carbon-fibre-composite market.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101643 McGuigan, Dr Katrina L; Blows, Prof Mark W

2015	\$86,000.00
2016	\$85,400.00
2017	\$130,000.00
Total	\$301,400.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to provide an in-depth characterization of pleiotropic effects across many traits, including fitness, in an outbred population of the fly, *Drosophila serrata*. The potential for one gene to affect many traits, pleiotropy, has been recognised for over 100 years. Pleiotropy is expected to underlie diverse biological phenomena, including evolution and age-related human diseases. Despite this, the contribution of pleiotropy to variation among individuals in appearance and in fitness remains poorly understood. By measuring the extent of pleiotropy and its fitness consequences, this project aims to advance understanding of how mutation and selection shape genetic variation and evolutionary potential in natural populations.

DP150103720 McLachlan, Prof Geoffrey J

2015	\$95,000.00
2016	\$91,100.00
2017	\$95,000.00
Total	\$281,100.00

Primary FoR 0104 STATISTICS

Administering Organisation The University of Queensland

Project Summary

Multiple testing procedures are among the most important statistical tools for the analysis of modern data. This project aims to develop new methods for providing more powerful simultaneous tests while controlling the proportion of false positive conclusions. They are proposed to be derived by the novel pooling of information in individual attribute based contrasts to produce a Weighted Individual attribute-Specific Contrast (WISC) based statistic. They will also exploit contextual information. They are expected to be of direct application to the problem of testing for no differences between two or more classes, as in the detection of differential expression in bioinformatics. Other key applications are expected to include biomedicine, economics, finance, genetics, and neuroscience.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101201 Meakins, Dr Felicity H; Pensalfini, Dr Robert J

2015	\$61,000.00
2016	\$105,500.00
2017	\$128,000.00
Total	\$294,500.00

Primary FoR 2004 LINGUISTICS

Administering Organisation The University of Queensland

Project Summary

The linguistic cradle of many Aboriginal children in remote Australia is a multilingual setting involving considerable mixing between languages. Children bring this linguistic background to the task of learning English. This project is the first investigation of a trilingual Indigenous community, Elliott (Northern Territory), where children grow up hearing Jingulu, Mudburra and Kriol. It aims to examine how people at Elliott manage multiple languages and how these languages have changed through mixing processes such as creolisation and code-switching. Exploring this dynamic language ecology is crucial to tailoring educational programs to suit the needs of Aboriginal children. It is expected to place Australia at the forefront of studies of complex language change.

DP150100539 Meunier, Prof Frederic A

2015	\$142,000.00
2016	\$128,500.00
2017	\$134,000.00
2018	\$30,000.00
Total	\$434,500.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

The fusion of secretory vesicles (SVs) by exocytosis underpins neuronal and hormonal communication. The aim of this project is to unravel all the steps bringing these vesicles to the plasma membrane where they dock. Specifically, we aim to unravel the role for the cytoskeleton in creating an interface where SV confinement leads to the appropriate pairing of molecules mediating the fusion between the vesicles and the plasma membrane. Unravelling these novel molecular mechanisms is essential for our understanding of neuronal function in the healthy nervous and hormonal systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100631 Morgan, Prof Richard G; McIntyre, A/Prof Timothy J; Buttsworth, Prof David R; Laux, Prof Christophe O; Gnoffo, Dr Peter A; Brandis, Dr Aaron M; Capra, Dr Bianca

2015	\$190,000.00
2016	\$153,400.00
2017	\$160,000.00
Total	\$503,400.00

Primary FoR 0901 AEROSPACE ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The aim of the project is to record the spectra of radiation from a region of rapidly expanding flow representative of the passage of the shock layer on a re-entry capsule from the windward to the leeward surfaces. The significance of this work is that it addresses a critical area of spacecraft where the uncertainties of our design techniques are of the order of 300 per cent in terms of surface heat transfer, and current vehicles have to use large safety factors to ensure survivability. The outputs from the project will be a data base of radiative parameters which should enable accurate models of the flow to be developed, which is expected to facilitate the design of advanced spacecraft with greater safety and reliability, and with lower structural mass.

DP150100645 Mueller, Prof Jochen F; Jiang, Dr Guangming; Thai, Dr Phong K; Ort, Dr Christoph; Covaci, Prof Adrian

2015	\$117,000.00
2016	\$115,100.00
2017	\$95,000.00
2018	\$50,000.00
Total	\$377,100.00

Primary FoR 0599 OTHER ENVIRONMENTAL SCIENCES

Administering Organisation The University of Queensland

Project Summary

This project aims to improve estimates of population drug use and chemical exposure by systematically studying the fate of drugs, organic pollutants (e.g. pesticides) and human biomarkers in sewers. The project aims to combine advanced experimental sewer research facilities with an analytical set-up and modelling expertise to address critical gaps in our knowledge of the fate of chemicals in sewers. The information could be used to provide accurate, cost-effective and near real-time estimates of chemicals entering the sewer system which could allow us to better estimate changes in population drug use, chemical exposure and health status.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100113 Mushin, Dr Ilana; Gardner, A/Prof Roderick J

2015	\$72,000.00
2016	\$57,500.00
2017	\$75,000.00
Total	\$204,500.00

Primary FoR 2004 LINGUISTICS

Administering Organisation The University of Queensland

Project Summary

An enduring problem in Indigenous schooling is the discrepancy in outcomes compared to mainstream children, but little is known about one crucial factor: the role of Indigenous ways of speaking and their ways of engaging with knowledge and learning. This ground-breaking project aims to compare preparatory school students in two urban settings: a mainstream school and a school with high Indigenous enrolments. The project also seeks to examine learning in children's homes to establish how the flow of knowledge is managed in Indigenous and mainstream families. By investigating these four settings, it is expected to provide important evidence for understanding how language and cultural ways of knowing contribute to the discrepancy in schooling outcomes.

DP150100162 Najman, Prof Jakob M; McGee, Dr Tara R; Farrington, Em/Prof David P; Williams, Prof Gail M; Clavarino, Asst Prof Alexandra M; Mamun, A/Prof Abdullah A; Alati, A/Prof Rosa

2015	\$226,000.00
2016	\$215,400.00
Total	\$441,400.00

Primary FoR 1608 SOCIOLOGY

Administering Organisation The University of Queensland

Project Summary

Antisocial behaviour involves about 10 per cent of children and/or adolescents. It has a substantial impact on many life outcomes including education, employment, family life, and offending. The costs of providing services to an antisocial child are 10 times higher than other children. Antisocial offspring are often children of antisocial parents and grandparents. The proposed project aims to assess antisocial behaviour transmitted across three generations, to document the predictors of this intergenerational transmission, and to describe how antisocial behaviour is changing over generations. This project aims to provide data to enable a more focussed delivery of services to antisocial families.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102658 Neal, Prof Andrew F; Vancouver, Prof Jeffrey B; Schmidt, A/Prof Aaron M

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
Total	\$236,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

The aim of this project is to develop and test a formal theory that explains the mechanisms by which people make choices amongst competing goals in a dynamic and uncertain environment ('multiple goal pursuit'). People have to manage competing goals in a wide range of settings (for example, work, education, sport), yet the mechanisms are poorly understood. The theory is expected to integrate formal theories of self-regulation with formal theories of decision making, to provide a more general account of multiple goal pursuit. The project aims to test the predictions of the theory in a series of experiments in which people have to pursue two goals simultaneously. The experiments allow us to test competing views, and understand the mechanisms involved.

DP150100395 Nguyen, Prof Anh V; Evans, Prof Geoffrey M

2015	\$110,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$345,100.00

Primary FoR 0914 RESOURCES ENGINEERING AND EXTRACTIVE METALLURGY

Administering Organisation The University of Queensland

Project Summary

Froth flotation is widely used for separating coal and minerals from the gangue. The largest particles that can be floated in the industry are 10 times smaller than the particles that can be floated under quiescent conditions. This project aims to better understand and quantify the detachment of large particles from the bubble surface. It aims to develop innovative modelling and experimental approaches to examine the effect of particle surface characteristics and hydrodynamic conditions on coarse particle detachment and flotation. New ways to save energy by floating coarse composite particles are proposed to be developed. This research is at the forefront of flotation science and technology, and is expected to deliver significant outcomes to the mining industry.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102453 Orchard, Dr Phil C

2015	\$58,000.00
2016	\$58,500.00
2017	\$31,760.00
Total	\$148,260.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The University of Queensland

Project Summary

This project examines why governments increasingly use force to deliberately displace their own populations on a massive scale, which is termed regime-induced displacement. Through a mix of quantitative and case study research, this project aims to explain why such actions have become rational strategies for regimes to respond to ethnic groups which may be a threat to them and how these regimes try to justify their behaviour in order to thwart or delay international action. This is a critical issue as beyond its human cost, regime-induced displacement can lead to state fragility and regional instability as cases from Darfur to Syria demonstrate. Consequently, it directly affects Australia's security interests and international responsibilities.

DP150101875 Ragan, Prof Mark A; Chan, Dr Cheong-Xin; Bhattacharya, Prof Debashish

2015	\$180,000.00
2016	\$172,600.00
2017	\$123,000.00
Total	\$475,600.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Queensland

Project Summary

Coral reefs are sustained by symbiosis between the coral host and dinoflagellates of genus Symbiodinium. Breakdown of this symbiosis under environmental stress results in coral bleaching and eventual death. This project aims to understand how dinoflagellate genomes have evolved to support a symbiotic lifestyle. The project aims to sequence genomes of Symbiodinium from reef corals and other hosts, and two free-living relatives. This should enable the identification of genes that have been gained or lost, or are under adaptive selection. This genome-scale perspective on the molecular systems implicated in the evolution of this symbiotic lifestyle has potential to inform strategies for preserving Australia's Great Barrier Reef in the face of climate variations.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104771 Reutens, Prof David C

2015	\$120,000.00
2016	\$172,600.00
2017	\$160,000.00
Total	\$452,600.00

Primary FoR 0903 BIOMEDICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project aims to develop novel neuronal current magnetic resonance imaging (nc-MRI) methods that harness the oscillatory behaviour of neuronal magnetic fields. Current methods of detecting neuronal activity in the living human brain have limited spatial and temporal resolution. Use of nc-MRI aims to overcome these limitations by imaging the effects on the MRI signal of small transient magnetic fields associated with neuronal activity. Signal-to-noise ratio is at the limits of detectability using current imaging systems and nc-MRI is yet to be convincingly demonstrated. An integrated framework for simulating nc-MRI in the visual cortex is expected to be developed.

DP150103964 Ritchie, A/Prof Brent W; Choi, Dr Andy S; Gossling, Prof Dr Stefan; Dwyer, Prof Larry M

2015	\$62,000.00
2016	\$60,400.00
2017	\$64,000.00
Total	\$186,400.00

Primary FoR 1506 TOURISM

Administering Organisation The University of Queensland

Project Summary

The demand for aviation is rapidly adding to carbon emissions. Little is known about consumer preferences for aviation carbon offsets and how they evolve over time. This hinders the expansion of voluntary schemes at a crucial period in history. This research will investigate consumers offset preferences and their willingness to pay for aviation carbon mitigation using a novel time series methodology. The project aims to inform government policies and to help industry to develop carbon offset programs which are more likely to be supported by consumers, thus helping to reduce carbon emissions in the long term. It also aims to profile carbon offsetting groups to support communication activities to increase the size and value of offsets.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103467 Rudolph, Prof Victor; Xing, A/Prof Huilin; Chen, Dr Zhongwei; Golding, Prof Suzanne D

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Carbonaceous mudstones associated with coal measures already exploited for gas present an attractive reservoir of methane. This project seeks to provide methods for accessing this gas. Mudstone associated with coal seam gas developments are very extensive and gas quantities may exceed even that in the coal itself. Further infrastructure and access permits are already in place for coal seam gas recovery. Unlike shale, which is fissile, mudstone is much softer, more malleable and plastic, and consequently will respond abnormally to hydraulic fracturing and propping, so new methods proposed to be developed in this project are needed for stimulation.

DP150101513 Shulmeister, Prof James P; Hesp, Prof Patrick A; Miot da Silva, Dr Graziela; Welsh, Dr Kevin J; Santini, Dr Talitha; Larsen, Dr Joshua; Gontz, A/Prof Allen M; Rittenour, Dr Tammy

2015	\$135,000.00
2016	\$119,900.00
2017	\$110,000.00
Total	\$364,900.00

Primary FoR 0406 PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Administering Organisation The University of Queensland

Project Summary

This project aims to generate fundamental information about the timing and mode of formation of sand dunes in the world's largest downdrift sand system, Cooloola and Fraser Island, Queensland. The project aims to provide a world class record of climate variability, sea-level change and long term climate change from the sub-tropics of Australia, an area critical to understanding global climate links and sea-level change but where high quality long-term records are sparse and little investigated. This project will also underpin the outstanding universal value of the Fraser Island World Heritage Area which is based on the area being the world's largest sand island, but for which scientific understanding of the sand dunes is remarkably poor.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104247 **Sinning, Dr Mathias**

2015	\$60,000.00
2016	\$52,700.00
2017	\$60,000.00
Total	\$172,700.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation The University of Queensland

Project Summary

This project aims to study dynamic aspects of inequality in Australia by exploring the changes in labour and housing market conditions and their relation to the changes in the distribution of income and wealth over the last decade. The project also aims to develop new econometric techniques to examine the factors that are responsible for the changes in the distribution of income and wealth and a range of labour and housing market outcomes. Particular attention will be paid to the role of the changes in individual-specific characteristics (such as education, age, employment status, and occupation) and neighbourhood-specific characteristics (such as house prices and population ageing) in producing inequality.

DP150100720 **Slaughter, Prof Virginia P; Peterson, Prof Candida C; de Rosnay, Dr Marc; Wellman, Prof Henry M; Begeer, Asst Prof Sander**

2015	\$140,000.00
2016	\$115,100.00
2017	\$60,000.00
Total	\$315,100.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Queensland

Project Summary

Theory of mind—our capacity to understand what other people think and feel—grows significantly in the preschool and early school years. This is recognised as a crucial period for social development yet 30 years of research has not yet answered these basic questions: Do children with relatively advanced theories of mind also excel at navigating the everyday world of friendship and peer group dynamics at school? And conversely, do developmental delays in acquiring a theory of mind explain some of the peer problems that children with autism or deafness face? The proposed longitudinal project aims to be the first to supply a comprehensive and causally convincing answer to these core questions.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102339 Smith, Prof Tom; Shi, Prof Jing; O'Neill, Prof Terence J; Walsh, A/Prof Kathleen D; Benson, A/Prof Karen L; Tian, Prof Dr Gary G; Wang, Asst Prof Yongxiang; Haq, Dr Mamiza

2015	\$70,000.00
2016	\$68,100.00
2017	\$72,000.00
Total	\$210,100.00

Primary FoR 1502 BANKING, FINANCE AND INVESTMENT

Administering Organisation The University of Queensland

Project Summary

The literature on the importance of political connections to firms and their value implications is scant. This project aims to develop a framework that depicts the interplay of political connections, institutional factors, corporate governance, media coverage and firm value. In particular, it investigates how political connections enhance the value of firms in China and how this changes as the market transitions.

DP150104147 Stokes, A/Prof Jason R; Yakubov, Dr Gleb; McGuckin, Prof Michael A; Williams, A/Prof Martin

2015	\$90,000.00
2016	\$86,300.00
2017	\$85,000.00
Total	\$261,300.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

Engineering coatings for water to be an effective lubricant is a significant challenge. The project seeks to emulate how nature builds highly lubricating water-rich polymer films on biological surfaces. This is intended to be achieved by directing the self-assembly of mucin macromolecules onto polymer brushes attached to a substrate, and then cross-linking the constituents to obtain a hydrated gel-like lubricating coating. This research is expected to provide new insights on the mechanisms by which mucin-rich fluids lubricate and protect biosurfaces, which is important to human health, nutrition and well-being. It may also lead to new discoveries for engineering surface coatings for biomaterials and nanomaterials.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100364 Teasdale, A/Prof Rohan D; Kerr, Dr Markus C

2015	\$129,000.00
2016	\$126,600.00
2017	\$115,000.00
Total	\$370,600.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

Using cellular and biochemical approaches this project aims to examine the membrane trafficking pathways hijacked by the pathogen Chlamydia and to define the key components of these pathways. Chlamydia are obligate intracellular pathogens responsible for a range of human and animal diseases. In order to survive within the host cell, the pathogen hijacks the host's membrane trafficking pathways to engineer an intracellular niche called an inclusion. In addition to providing a permissive environment, this strategy also shields the pathogen from the host's immune system.

DP150104828 Vinu, Prof Ajayan; Jaroniec, Prof Mietek

2015	\$100,000.00
2016	\$124,700.00
2017	\$100,000.00
Total	\$324,700.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to design multifunctional, noble metal-free, and highly ordered mesoporous fullerene with a high conductivity and different porous structures, functionalised with nitrogen and/or metal and metal oxide nanoparticles in both powder and film forms. The most promising, stable, and highly efficient noble metal-free electrode catalyst system will be designed with the functionalised mesoporous fullerenes for polymer electrolyte membrane and direct methanol fuel cells. This novel highly efficient and low cost electrode system for fuel cells aims to help address clean energy generation and environmental problems and create new opportunities for Australian industries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103714 Wells, Dr James W; Steptoe, Dr Raymond J; Frazer, Prof Ian H

2015	\$163,000.00
2016	\$141,900.00
2017	\$160,000.00
Total	\$464,900.00

Primary FoR 0606 PHYSIOLOGY

Administering Organisation The University of Queensland

Project Summary

The overall aim of this project is to understand the cellular mechanisms that maintain skin integrity, and in particular, the role of a novel population of regulatory cells in mediating this process. This is important for our understanding of fundamental physiological interactions in the skin. The proposed research aims to uncover essential new information regarding a recently discovered population of regulatory cells, with particular respect to understanding their mechanisms of action. The outcomes of this work should provide fundamental new knowledge of skin physiology and lead to novel insights regarding how skin integrity may be maintained following the disruption of homeostasis mechanisms.

DP150102604 Wiles, Prof Janet; Angus, Dr Daniel J; Chenery, Prof Helen J

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Queensland

Project Summary

This project aims to develop an automated conversation analysis system to quantify how communication changes over extended periods of time. It is innovative in proposing to extend the theory and methods of recurrence analysis (a dynamical systems technique) to interacting modalities combining text, audio and video, and to longitudinal analyses. The project is significant in being the first to aim to measure communication dynamics over time in the fields of education, health, public discourse and science. It is expected to result in new theories and methods for recurrence analysis validated using real-world data; and to enable new technologies for evaluating professional communication training and communication changes resulting from education or disease progression.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100198 Wilson, A/Prof Robbie S; Fisher, Dr Diana O; Campbell, Dr Hamish A

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0608 ZOOLOGY

Administering Organisation The University of Queensland

Project Summary

This project aims to demonstrate how habitat complexity shapes motor ageing in wild dasyurid marsupials, and to improve these animals' motor function, slow its decline and increase reproductive output via behavioural and physiological changes. Motor decline should dramatically impact an animal's growth, survival and reproduction by affecting how it moves through habitats when foraging, seeking mates, or escaping from predators. However, little is known about the environmental drivers of motor ageing in wild animals. Our project addresses an important gap in the field of evolutionary ecology. Since decline in muscle function affects the quality of Australian's life, our work could lead to important economic and health implications.

DP150101300 Wilson, Dr Kerrie A; McAlpine, Prof Clive A; Bryan, Dr Brett A; Arcese, Prof Peter; Chan, A/Prof Kai M

2015	\$143,000.00
2016	\$128,500.00
2017	\$124,000.00
Total	\$395,500.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Administering Organisation The University of Queensland

Project Summary

This project aims to develop new approaches using causal inference, optimal allocation theory, and spatial statistics to characterise impacts on a diverse suite of ecosystem services. It will endeavour to develop case studies from three continents and generalisations explicitly tested using simulated landscapes. Environmental and agricultural policies promote land sharing (biodiversity-friendly production) or land sparing (protected areas, with yield increases elsewhere). Yet the impacts of such policies in diverse contexts and for multiple outcomes are poorly understood. The project could advance our ability to deliver sustainable outcomes and more effective as well as equitable policies for production landscapes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103343 Wilson, Dr Tom G; Rowe, Dr Francisco; Simpson, Prof Ludi S

2015	\$115,183.00
2016	\$94,400.00
2017	\$84,397.00
Total	\$293,980.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation The University of Queensland

Project Summary

The aim of this project is to make significant advances in two related areas of regional, council area and local population forecasting, namely improving accuracy, and providing an indication of forecast uncertainty. Population forecasts often turn out to be far more inaccurate than users realise and fail to come with any information about reliability. Every year forecasts inform a wide variety of planning and policy development activities and influence investment decisions worth billions of dollars. In order to increase the value of forecasts to users, this project aims to combine methods from a range of disciplines to devise more accurate ways of forecasting populations, and provide accompanying information on their likely error.

DP150101367 Yap, Prof Alpha S

2015	\$120,000.00
2016	\$119,900.00
2017	\$130,000.00
2018	\$80,000.00
Total	\$449,900.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Queensland

Project Summary

This project examines how tissues use mechanical tension to preserve their integrity. This comes from the recent appreciation that cells pull on the connections between each other to generate tension. Further, molecular mechanisms exist for cells to sense changes in this tension and then to enlist the appropriate responses to restore tension. The project aims to test how local changes in tension are detected and corrected, when tissue integrity is compromised by very different causes. The project endeavours to establish a new conceptual paradigm for understanding tissue homeostasis, based on cell biology and biomechanics, with implications for developmental biology and tissue engineering.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100798 Zhao, Dr Chun-Xia; Middelberg, Prof Anton P; Shao, Prof Dr Zhengzhong

2015	\$155,000.00
2016	\$148,600.00
2017	\$155,000.00
Total	\$458,600.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Queensland

Project Summary

This project aims to discover and develop new methods and knowledge for the precision engineering of next-generation core-shell materials using sustainable biomolecular dual-template processes. This research builds on a recent breakthrough - emulsion and biomimetic dual-template technology for facile preparation of silica capsules, and is expected to revolutionise current approaches for making core-shell materials. Significant outcomes are expected to be achieved through building fundamental understanding around this breakthrough, including new concepts for hierarchical nanomaterials based on biomolecular design, new molecular and engineering design rules for core-shell materials, and novel materials for applications in sustained release and delivery systems.

DP150103008 Zhou, Prof Xiaofang; Yang, Dr Yi

2015	\$220,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$494,300.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation The University of Queensland

Project Summary

This project aims to develop breakthrough database technology that leverages the advances in video data capturing, computer vision based object recognition, multimedia tagging, large scale database systems and parallel processing, to provide the capability of managing massive video data with enriched semantic information and enabling database-like flexible and efficient video information search. It is expected to establish a new data management and processing foundation for big video data analytics.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100701 Zou, Prof Jin; Gao, Dr Qiang

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The University of Queensland

Project Summary

The use of semiconductor nanowires has uncovered many scientific curiosities and extended their potential applications in many fields. In general, nanowire growth is governed by metallic catalysts, involving nanowire nucleation and growth. So far, the role of catalysts during nanowire nucleation is not clear and needs urgent attention. This project aims to investigate the behaviour of catalysts before and during the nucleation of III-V nanowires by means of nano-characterisation to ultimately integrate high-quality III-V nanowires on silicon substrates. The new knowledge developed from this project is expected to provide critical insights for developing high-quality III-V nanowires integrated on silicon substrates.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of the Sunshine Coast

DP150101485 Polkinghorne, Dr Adam M; Belov, Prof Katherine; Timms, Prof Peter; Myers, Asst Prof Garry S; Papenfuss, A/Prof Anthony T

2015 \$155,000.00

2016 \$148,600.00

2017 \$155,000.00

Total \$458,600.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation University of the Sunshine Coast

Project Summary

Chlamydial infection of the eyes is a significant cause of disease and death in koalas, contributing to the ongoing decline of this native species. Little is known about what influences the outcome of these infections, challenging efforts to manage and control koala chlamydial blindness. This project aims to evaluate whether differences in the infecting Chlamydia pecorum strains or the koala immune response, are associated with the outcome of chlamydial ocular infection. In addition to helping us to understand and prevent blindness in koalas, this project should significantly expand our knowledge of the koala immune system and generate an array of koala immunological assays, outcomes that may benefit all koala conservation efforts.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

South Australia

The Flinders University of South Australia

DP150102903 Beheregaray, Prof Luciano B; Bernatchez, Prof Louis

2015 \$146,000.00

2016 \$150,600.00

2017 \$169,000.00

Total \$465,600.00

Primary FoR 0604 GENETICS

Administering Organisation The Flinders University of South Australia

Project Summary

This project aims to use an evolutionarily young and ecologically important fish clade to understand adaptive resilience and to test predictions derived from the 'climatic variability hypothesis' for the major climatic regions of mainland Australia. Correlative surveys along landscapes and mechanistic experimental studies will be integrated to implement a comparative evolutionary genomics framework capable of assessing the genetic basis of adaptation and the evolutionary resilience of populations and lineages. This is expected to clarify climatic and geographic correlates of adaptation across a vast area of Australia and to disentangle responses to environmental change in an emerging model system for adaptation research.

DP150101905 Brewer, Prof Neil; Weber, Dr Nathan; Wells, Prof Gary L

2015 \$95,000.00

2016 \$124,700.00

2017 \$112,000.00

2018 \$120,000.00

2019 \$107,000.00

Total \$558,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

The traditional police line-up often produces inaccurate decisions, with witnesses failing to pick the culprit or picking an innocent suspect. Surprisingly, despite all the scientific advances with respect to the collection of eyewitness evidence, there is absolutely no objective basis for selecting the 'fillers' to accompany the suspect in the line-up. Guidelines merely suggest the fillers should not be too similar or too dissimilar to the suspect. However, the fillers are likely to have a crucial influence on decision accuracy. This project aims to remedy this striking deficiency by developing and testing a flexible and universally applicable methodology for photo array composition that will optimise judgmental discriminability and curtail bias.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100618 Filar, Prof Jerzy A; Gaitsgory, Prof Vladimir; Ejov, Dr Vladimir V; Roddick, Prof John F

2015	\$125,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$379,700.00

Primary FoR 0104 STATISTICS

Administering Organisation The Flinders University of South Australia

Project Summary

This project aims to: advance the perturbation theory of dynamic and stochastic games; further develop approximations of infinite dimensional linear programs by their finite dimensional counterparts, and by finding asymptotic limits of spaces of occupational measures, by solution of successive layers of fundamental equations; explain and quantify the "exceptionality" of instances of systems that are genuinely difficult to solve; and, capitalise on the outstanding performance of our Snakes-and-Ladders Heuristic (SLH) for the solution of the Hamiltonian cycle problem to identify its "fixed complexity orbits" and generalise this notion to other NP-complete problems.

DP150100619 Goldsmith, Prof Andrew J; Halsey, Prof Mark; Bright, Dr David A

2015	\$40,000.00
2016	\$109,300.00
2017	\$85,000.00
Total	\$234,300.00

Primary FoR 1602 CRIMINOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

Gun violence causes significant harm across Australian communities. Excluding sexual assault, firearms feature in nearly one in 10 violent crimes. The annual costs of gun violence run into tens of millions of dollars. This project aims to make an original qualitative contribution to understanding and preventing gun violence in three contexts: drug dealing/trafficking, other organised crime activity, and armed robbery. The proposed research would be the first study nationally - and one of the very few internationally - to interview convicted gun crime users about the acquisition and use of firearms in criminal life. Project results are expected to have direct implications for reducing the impact of gun violence in Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100215 Gradisar, A/Prof Michael; Lack, Prof Leon; Carskadon, Prof Mary A

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$30,000.00
2019	\$30,000.00
Total	\$385,500.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

Notwithstanding cultural and social influences, bedtimes gradually become later during adolescence, suggesting common biological contributions. Reductions in sleep pressure, delays in the 24-hour circadian rhythm, and genetic associations have been implicated, yet comprehensive prospective data from these biological sleep processes are lacking. This project aims to use periodic 'in-lab' assessments to unmask young adolescents' circadian rhythm delay and sleep pressure which may predict naturalistic sleep behaviour in their home environment. It is predicted that adolescents who show both low sleep pressure and later circadian delay to possess later bedtimes, thus enhancing knowledge of covert biological mechanisms sabotaging healthy adolescent sleep.

DP150100661 McCarley, Prof Jason S; Nicholls, Prof Michael E; Kramer, Prof Arthur

2015	\$95,000.00
2016	\$100,700.00
2017	\$115,000.00
2018	\$83,000.00
Total	\$393,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

The ability of individual operators to search for and detect targets is a weak link in many military, medical, and industrial operations. Teams of operators, however, can perform well even when individuals do not. This project aims to investigate a promising new eye-tracking technique, gaze-linking, that helps searchers collaborate efficiently by allowing each to know where the other is looking. This research builds on mathematical models of information processing to identify strategies that optimise gaze-linked collaboration, and is expected to develop principles for training gaze-linked searchers. Gaze-linking offers a promising, and potentially economical, technique for improving human performance, increasing efficiency and safety in a variety of tasks.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103018 Mitchell, Prof James G

2015	\$150,000.00
2016	\$124,700.00
2017	\$115,000.00
Total	\$389,700.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

This project aims to use a single-cell approach to develop a quantitative analysis of single-cell interactions to advance our understanding of complex bacterial behaviour fundamental to ecology, industry, technology and disease. Bacteria are ubiquitous on Earth and play key roles in nutrient cycles, biogeochemistry, pathogenesis, symbiosis and bioremediation among other processes. They exhibit complex behaviour and continuously invade animals, plants and new habitats. These behaviours are poorly understood in natural communities.

DP150103022 Oppenheimer, Prof Melanie N; Eklund, Prof Erik C; Scott, Prof Joanne

2015	\$72,160.00
2016	\$67,800.00
2017	\$39,442.00
Total	\$179,402.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The Flinders University of South Australia

Project Summary

Australia and similar western democracies continue to wrestle with growing citizen disengagement with political processes and declining levels of active participation in society. This project is expected to provide the first historical examination of the Australian Assistance Plan (AAP), an innovative yet forgotten program from the 1970s. The AAP sought to reframe participation at a local level, stimulate voluntary organisations and provide a framework that engaged with all levels of governments. Using archival sources and oral history methods, the project seeks to offer a new interpretation of an important initiative in Australian history and demonstrate how historical analysis can inform policy and shape debates in government and non-profit sectors in the future.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100264 Prideaux, A/Prof Gavin J; Hutchinson, Dr Mark N

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

The Wellington Caves in central eastern New South Wales are Australia's most historically significant fossil locality and preserve one of the world's most complete records of vertebrate life spanning the past 4 million years. To date this unique archive has been vastly under-exploited as a source of information on how faunas respond to increased aridity and climatic variability, as well as human activities over the past 50 000 years. This project aims to elucidate how climate change drove the evolution of the modern fauna of eastern Australia by analysing changes in diversity, diet and community structure over time. It may also help break the 130-year climate-versus-humans deadlock over what drove the Pleistocene megafaunal extinctions.

DP150103663 Roach Anleu, Prof Sharyn L; Rottman, Dr David B

2015	\$119,941.00
2016	\$115,900.00
2017	\$107,602.00
2018	\$116,002.00
Total	\$459,445.00

Primary FoR 1801 LAW

Administering Organisation The Flinders University of South Australia

Project Summary

This project examines emotion and emotional expression in judicial performance. Although judging is understood as unemotional, changing norms demand judicial emotional awareness and impose greater scrutiny of in-court judicial behaviour, creating practical tension for the judiciary and conceptual tension in understanding judging. Using surveys, interviews and observations of the Australian judiciary, and judicial performance evaluation data from the United States of America, this research examines whether judicial emotion and emotional display enhance or detract from judicial performance, considering impartiality and legitimacy of judicial authority. It aims to generate substantial new knowledge about judicial decision making and judicial behaviour.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101354 Shapter, Prof Joseph G; Andersson, A/Prof Gunther G; Kloo, Prof Lars A

2015	\$135,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$409,300.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

This project aims to build novel, highly efficient electrodes using a nanostructured layer approach. The layers are proposed to be made of chirally-selected carbon nanotubes, conducting polymers and charge carrier blocking layers and provide tunable energy pathways for electrons and holes. The project aims to probe these pathways to understand carrier lifetimes and how charge is transported from one layer to the next, ultimately leading to an ability tune electrodes such that matched 'downhill' energetic pathways exist leading to unprecedented charge carrying capability. The electrode properties can be tuned with the selection of the layer materials and is expected to find applications in fields ranging from photovoltaics to sensors to electronics.

DP150101295 Tiggemann, Prof Marika

2015	\$99,180.00
2016	\$95,700.00
2017	\$90,360.00
2018	\$84,699.00
Total	\$369,939.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The Flinders University of South Australia

Project Summary

Commentators and researchers from a number of Western countries, including Australia, have suggested that idealised media images in fashion magazines should carry some sort of disclaimer informing readers when these images have been digitally enhanced. The overall aim of this project is to investigate the impact of disclaimer labels on women's mood and body dissatisfaction. Expected outcomes include recommendations to policy makers as to the most effective form of intervention, as well as increased theoretical understanding of the operation of disclaimer labels.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

**DP150102227 Wakerman, Prof John; Humphreys, Prof John S; Bourke, A/Prof Lisa; Dunbar, Prof Terry E;
Lyle, Prof David; Carey, Prof Timothy A; Jones, Prof Michael P; Guthridge, A/Prof Steven L;
Zhao, Dr Yuejen**

2015 \$180,000.00

2016 \$210,600.00

2017 \$127,000.00

Total \$517,600.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation The Flinders University of South Australia

Project Summary

This project aims to examine the impact of the increasing levels of short-term health staffing in remote communities upon service acceptability to patients, workload and attitudes of long-term resident primary health care staff, and the effectiveness and cost of health services. There is a dearth of information about this 'fly in/fly out' (FIFO) workforce in remote communities, which have the worst health outcomes in the country. The project aims to inform consumers, health practitioners, health service planners and policy-makers about the impact of FIFO, as well as to contribute to the development of strategies designed to stabilise the remote health workforce.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Adelaide

DP150103287 Amery, Dr Robert M; Simpson, Prof Jane H

2015 \$118,400.00

2016 \$109,300.00

2017 \$130,000.00

Total \$357,700.00

Primary FoR 2004 LINGUISTICS

Administering Organisation The University of Adelaide

Project Summary

The Ngarrindjeri language of the Lower Murray of South Australia was richly documented in the nineteenth and mid-twentieth centuries. The largest body of texts (163 texts in Berndt and Berndt, 1993) is a treasure-trove of language and cultural knowledge from the 1940s, but has received little linguistic attention, because of difficulties in interpreting writing conventions and because of the inadequate translations provided. Through systematic linguistic analysis and reconstructions, this project aims to shed light on how Ngarrindjeri changed over the 100 years since first documentation, how clan languages differed, and how Ngarrindjeri texts and sentences were structured. It is expected to provide important insight into the variation expected in language contact situations.

DP150101664 Austin, A/Prof Jeremy J

2015 \$150,000.00

2016 \$126,600.00

2017 \$132,000.00

Total \$408,600.00

Primary FoR 0699 OTHER BIOLOGICAL SCIENCES

Administering Organisation The University of Adelaide

Project Summary

This project aims to develop and apply a novel targeted sequence capture and high throughput DNA sequencing approach to simultaneously type thousands of informative identity, ancestry and phenotype markers in a single assay to facilitate identification of unknown suspects and missing persons. DNA based human identification is both critical and central to criminal and coronial investigations, disaster-victim and missing persons identification, repatriation of war dead and counter-terrorism operations. Persistent technological and conceptual issues associated with the application of standard procedures to trace degraded DNA, or when profiles have no match in DNA databases, limit their application to real-world human identification problems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101622 Dawson, Prof Bruce R; Clay, Em/Prof Roger W; Hill, Dr Gary C

2015	\$140,000.00
2016	\$134,300.00
2017	\$140,000.00
2018	\$140,000.00
2019	\$140,000.00
Total	\$694,300.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Adelaide

Project Summary

A major upgrade is under-way to enhance the sensitivity of the 3000 square kilometre Pierre Auger Observatory in its search for the origin of the highest energy cosmic rays, the most energetic particles known in the Universe. This follows an unexpected Auger result that indicates a significant fraction of these cosmic rays are heavy nuclei. This project, assisting the upgrade, is expected to significantly improve the observatory's ability to identify the mass, and hence the electric charge, of the incoming cosmic rays, allowing astrophysical source directions to be identified for the low charge particles less affected by cosmic magnetic fields. The project will also contribute to the understanding of particle interactions at energies well beyond those explored at the Large Hadron Collider.

DP150101730 Glorie, Dr Stijn; Collins, Prof Alan S; Xiao, Prof Dr Wenjiao; Evans, Dr Noreen J

2015	\$60,000.00
2016	\$86,300.00
2017	\$70,000.00
Total	\$216,300.00

Primary FoR 0403 GEOLOGY

Administering Organisation The University of Adelaide

Project Summary

The consumption of the Tethys Ocean and the associated collision of Gondwana-derived terranes with Eurasia resulted in the uplift of the highest mountain belt on Earth: the Himalayas. However, stresses from this collision zone propagated far into the Eurasian interior by reactivating faults and creating mountain belts along these fault zones. This project aims to map and model how and when fault (re)activation occurred by integrating multi-method thermochronological and structural data on major Meso-Cenozoic Central Asian fault systems. The resulting time-integrated tectonic model will aid in the understanding of the India-Eurasia collision, the building of the mountainous Central Asian landscape and its influence on the Asian climate.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104547 Hugo, Prof Graeme J

2015	\$210,000.00
2016	\$181,800.00
2017	\$200,000.00
2018	\$30,000.00
2019	\$30,000.00
Total	\$651,800.00

Primary FoR 1603 DEMOGRAPHY

Administering Organisation The University of Adelaide

Project Summary

The replacement of permanent displacement by transnationalism as the dominant paradigm in migration has had little impact on demographic measurement and study of migration. This project seeks to rethink demographic concepts of migration to incorporate important elements such as diaspora, circular migration and transnational linkages. It aims to show how innovative use of traditional demographic data with a range of quantitative and qualitative research can yield important insights into diaspora. Case studies of six countries will be undertaken to increase understanding of the initiation, maintenance and significance of diaspora and its potential for enhancing development and reducing poverty in origins.

DP150102264 Kaiser, A/Prof Brent N; Tyerman, Prof Stephen D; Smith, A/Prof Penelope M; Unkovich, Dr Murray J

2015	\$131,000.00
2016	\$123,700.00
2017	\$140,000.00
2018	\$60,000.00
Total	\$454,700.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Adelaide

Project Summary

This project aims to investigate the role of a regulatory locus in the regulation of ammonium transport in plants and the interacting genetic and biochemical signalling promoting the interaction. Ammonium is an important nutrient source for plant growth and development. It has been recently identified that a new transport mechanism (AMF1) mediates ammonium transport across legume root nodule cellular membranes. AMF1 was identified through a transcriptional interaction with a membrane localised bHLHm1 transcription factor. Both bHLHm1 and AMF1 belong to a unique chromosomal regulatory locus common across sequenced dicot plant species.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103442 Larusson, A/Prof Finnur

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Adelaide

Project Summary

This is a project for fundamental research in pure mathematics. It is focused on an emerging subfield of complex geometry concerned with spaces and maps that exhibit exceptional flexibility properties, which often go hand-in-hand with a high degree of symmetry. The project aims to develop the foundations of this new area, solve several open problems, and pursue interconnections with and applications to algebraic geometry, complex analysis, geometric invariant theory, and topology.

DP150103164 Leinweber, Prof Derek B

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The University of Adelaide

Project Summary

Quantum chromodynamics describes the fundamental strong interactions between quarks and gluons as they compose hadrons such as the proton or neutron. Beyond these lowest-energy systems, the quantum mechanical excitation spectra display a rich and complex structure. Remarkably, little is known about the internal structure of these states. The central goal of this project is to unveil the nature of hadrons and their excited states using the first principles approach of lattice gauge theory. By elucidating aspects of hadron structure in terms of the most fundamental non-perturbative quark and gluon fields, the project will create new knowledge impacting on renowned experimental programs at international facilities.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103414 Lowe, Prof Andrew J; Breed, Dr Martin F; Byrne, Dr Margaret; Lascoix, Prof Martin D; Stephen, Dr John R; Vendramin, Dr Giovanni G

2015	\$153,000.00
2016	\$110,300.00
2017	\$110,000.00
Total	\$373,300.00

Primary FoR 0604 GENETICS

Administering Organisation The University of Adelaide

Project Summary

Using the Australian flora as our model, this project aims to tackle a central issue of evolution and conservation - what drives species adaptation? Since dispersal should override selection in populations, we predict that plants that are good dispersers will display weak signals of adaptation, but a higher capacity to adapt, than poorer dispersers. From these expectations we plan to develop a new adaptation guild classification, and test predictions using ecological genomics and functional genetics at a continental and multi-species scale. In addition to progressing a central tenet of evolutionary biology, this project aims to improve seed sourcing and biodiversity management, readily applicable to plants that can be quickly classified by life history traits.

DP150101760 McLaughlin, Prof Michael J; Losic, Prof Dusan; Tavakkoli, Dr Ehsan; Kirby, Dr Jason K

2015	\$146,000.00
2016	\$136,200.00
2017	\$149,000.00
Total	\$431,200.00

Primary FoR 0703 CROP AND PASTURE PRODUCTION

Administering Organisation The University of Adelaide

Project Summary

This project seeks to evaluate the unique properties of graphene to more effectively engineer novel fertilizers with properties that can enhance nutrient efficiency and reduce losses to the environment. More efficient and effective fertilizer formulations are needed to improve nutrient use efficiency in agricultural systems globally, and for effective biofortification of staple food crops with essential micronutrients. Nitrogen may be lost from soil through leaching and gaseous losses to the atmosphere. Phosphorus, as well as copper, manganese and zinc, are prone to reactions in soils and during manufacturing which reduces their effectiveness.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103143 McMahon, A/Prof Jennifer A; Sinnerbrink, Dr Robert S; Guyer, Prof Paul; von Sturmer, Mr Daniel; Matthen, Prof Mohan P; Freeland, Prof Cynthia A; Healy, Ms Claire; Cordeiro, Mr Sean G

2015	\$80,000.00
2016	\$91,100.00
2017	\$80,000.00
Total	\$251,100.00

Primary FoR 2203 PHILOSOPHY

Administering Organisation The University of Adelaide

Project Summary

This project explores how artistic value and meaning are attributed to artworks and how cultural artefacts and imaginative constructs may be seen to motivate ethical or socially oriented behaviour. It investigates this theme through an innovative new medium, involving a website and imagery, through which the expertise of philosophers and artists can be brought to bear on a social problem. Its outcomes will include new understanding of the process of perceiving meaning and value as a response to cultural artefacts.

DP150102230 Nathan, Prof Graham 'Gus' J; Alwahabi, A/Prof Zeyad T; Arjomandi, Dr Maziar; Tian, Dr Zhao F; Abraham, Prof John; Steinfeld, Prof Aldo

2015	\$220,000.00
2016	\$191,800.00
2017	\$200,000.00
Total	\$611,800.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Adelaide

Project Summary

The project aims to provide the new understanding of, and computational design tools for, next generation solar thermal particle receivers and their hybrids. Particle receivers, which heat fine particles in suspension, offer much greater efficiency than current tubular receivers, but are presently unreliable due to the poor understanding of the complex and coupled mechanisms that govern their performance. The results are expected to speed up the development and roll-out of these devices, to deliver cost-effective, low-emissions energy technologies for future power generation and thermo-chemical processes. The aims will be met by the parallel application of advanced laser diagnostic measurements and computational fluid dynamics modelling techniques.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104206 Navarro, A/Prof Daniel J; Lee, Prof Michael D

2015	\$75,000.00
2016	\$81,500.00
2017	\$84,000.00
2018	\$90,000.00
Total	\$330,500.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of Adelaide

Project Summary

How do people make choices in a complex world? Making good choices requires expertise, but people must often forego rewards in order to acquire this knowledge. This is the essence of an "explore-exploit dilemma": to maximise rewards across a long time frame, people must take the time to explore and learn now. Empirically, this project aims to unify much of the existing psychological literature and extend it to cover richer, more complex problems. Theoretically, the project aims to use tools from machine learning to compare human decision making to optimal planning models.

DP150104516 Owens, Prof Rosemary J; Stewart, Prof Andrew J; Hewitt, A/Prof Anne E; Howe, Dr Joanna

2015	\$32,000.00
2016	\$88,200.00
2017	\$52,000.00
2018	\$35,000.00
Total	\$207,200.00

Primary FoR 1801 LAW

Administering Organisation The University of Adelaide

Project Summary

This project aims to examine the regulatory challenges relating to post-secondary work experience, such as internships, in the areas of labour and employment, anti-discrimination and workers compensation law in Australia. The analysis is designed to establish a global and comparative context, examining policy and regulatory responses in Canada, Europe (including Britain), New Zealand, and the United States of America and at the international level. By offering a comprehensive analysis of the theoretical and practical implications of law's boundary between work and education, it is expected to identify optimum approaches to the regulation of post-secondary work experience, and thereby expand policy debates and enhance future law reform.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104515 Paton, Prof James C; McDevitt, Dr Christopher A

2015	\$140,000.00
2016	\$134,300.00
2017	\$110,000.00
Total	\$384,300.00

Primary FoR 0605 MICROBIOLOGY

Administering Organisation The University of Adelaide

Project Summary

The poly-histidine triad (Pht) proteins are a poorly characterised family of surface proteins expressed by the genus *Streptococcus* and other Gram-positive genera. Recent studies suggest an important role for Pht proteins in survival of these bacteria in low zinc (Zn) environments. The project hypothesis is that Pht proteins specifically recruit Zn from the extracellular environment and somehow make it available to ATP binding cassette (ABC) transport systems located in the bacterial plasma membrane, beneath the cell wall, facilitating Zn uptake by the bacterium. The aim of this project is to conduct comprehensive molecular characterization of the interactions between Pht proteins, Zn and ABC transporters, and the role of the histidine triad motifs in these interactions.

DP150102860 Peet, Dr Daniel J; Rychkov, A/Prof Grigori Y; Gleadle, Prof Jonathan M

2015	\$123,000.00
2016	\$118,000.00
2017	\$123,000.00
Total	\$364,000.00

Primary FoR 1116 MEDICAL PHYSIOLOGY

Administering Organisation The University of Adelaide

Project Summary

Factor inhibiting HIF-1 (FIH-1) is an oxygen-sensing asparaginyl hydroxylase. A bioinformatic search identified specific transient receptor potential (TRP) ion channels as likely substrates. The hypothesis is that TRP channels are regulated by hypoxia, mediated through a novel mechanism of oxygen-dependent hydroxylation by FIH. The aim of this project is to investigate how hydroxylation by FIH mediates the hypoxic regulation of TRP channels. Preliminary data show that the first candidate, TRPV3, is activated in hypoxia, is hydroxylated by FIH, and hydroxylation mediates changes in activity. Ion channels are important for the physiological response to hypoxia, and this project aims to define a novel mechanism for this response, with relevance to mammalian physiology.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103280 **Perfors, Dr Amy F; Shafto, A/Prof Patrick**

2015	\$90,000.00
2016	\$86,300.00
2017	\$95,000.00
2018	\$30,000.00
Total	\$301,300.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The University of Adelaide

Project Summary

Most of the data we see every day, from politics to gossip, comes from other people. Making inferences about such data is difficult because the people who provided it may have biases or limitations in their knowledge that we do not know about and must figure out. This project uses a series of experiments tied to normative computational models of social reasoning to explore how people solve this problem. This work has the potential to make a major impact in understanding how information is understood and shared, especially when it is about topics that people lack firsthand knowledge about, like climate change. The computational models also have applications to the development of expert systems upon which our information economy relies.

DP150102385 **Roberts, Prof Anthony J; Kevrekidis, Prof Ioannis G**

2015	\$115,000.00
2016	\$100,700.00
2017	\$105,000.00
2018	\$105,000.00
2019	\$105,000.00
Total	\$530,700.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation The University of Adelaide

Project Summary

This project aims to develop and implement a systematic approach, both analytic and computational, to extract compact, accurate, system level models of complex physical and engineering systems. The wide ranging methodology is to construct computationally efficient "wrappers" around fine scale, microscopic, detailed descriptions of dynamical systems (particle or molecular simulation, or partial differential equations or lattice equations). Comprehensively accounting for multiscale interactions between subgrid processes among macroscale variations ensures stability and accuracy. Based on dynamical systems theory and analysis, this approach is expected to empower systematic analysis and understanding for optimal macroscopic simulation for forthcoming exascale computing.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104263 Russell, Dr Bayden D; Connell, Prof Sean D; Helmuth, Prof Brian; Kelaher, Dr Brendan P; Sara, Prof Gianluca; Harley, A/Prof Christopher

2015	\$110,000.00
2016	\$134,300.00
2017	\$119,000.00
Total	\$363,300.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Adelaide

Project Summary

This project aims to bridge the gap between physiology and ecology in kelp forest species by developing mechanistic models to predict change and, in an unprecedented step, test them in long-term experiments at naturally acidified sites to understand the consequences of ocean acidification (OA) and warming for kelp forests. Ecosystem change is a frequent outcome of decadal modifications of the physical and chemical environment. Whilst these changes often involve degradation from productive states, we have a poor understanding of the mechanisms which drive change. Key stressors in marine systems, OA and warming are predicted to drive loss of kelp forests but we still don't understand the reality of these predictions.

DP150100930 Semmler, Dr John G; Ridding, A/Prof Michael C; Ziemann, Prof Dr Ulf

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Adelaide

Project Summary

Ageing is associated with a pronounced decline in many motor, cognitive, and other brain functions, but the cause remains elusive. This project will examine the mechanisms that contribute to a decline in brain plasticity and motor function in the elderly. Using novel brain stimulation techniques, the project aims to develop an optimal approach to boost plasticity in the ageing brain and improve motor function. A better understanding of changes in brain function and plasticity with advancing age is expected to help to optimise the design of preventative programs aimed at rejuvenating motor and cognitive function in the elderly.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103009 Shearwin, Dr Keith E; Dodd, Dr Ian B; Sneppen, Prof Kim

2015	\$78,000.00
2016	\$79,600.00
2017	\$84,000.00
Total	\$241,600.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Adelaide

Project Summary

Engineered genetic circuits with predictable and robust behaviour promise unprecedented environmental and economic benefits. Yet much work remains to be done before living devices can routinely be built from a standardised set of biological parts - the goal of synthetic biologists. By studying how natural genetic switch circuits respond to transient signals, this project aims to uncover a set of design rules which could be used to construct and control purpose-built genetic networks and pathways. The results of this project are expected to add to the molecular toolkit available to synthetic biologists.

DP150104871 Shen, Prof Hong

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0806 INFORMATION SYSTEMS

Administering Organisation The University of Adelaide

Project Summary

Protecting sensitive information in large network traffic flows while ensuring data usability for classification emerges as a critical problem of increasing significance. Existing techniques do not work on highly heterogeneous traffic from big-data applications for both privacy protection and classification (such as port-based and load-based methods). This project investigates new theories, methods and techniques for solving this problem. It proposes to develop a set of effective methods for privacy-preserving data publication through combining randomisation with anonymisation, and for classifying the published data through uncertainty leveraging by probabilistic reasoning and accuracy lifting by inter-flow correlation analysis and active learning.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103101 Thomas, Prof Anthony W

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$120,000.00
2019	\$120,000.00
Total	\$595,100.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The University of Adelaide

Project Summary

This project aims to provide a deeper understanding of the structure of strongly interacting particles, which make up approximately 98% of the visible mass of the Universe. This constitutes one of the five great challenges in modern nuclear science. Drawing on state-of-the-art supercomputer simulations and experiments at the world's leading laboratories for subatomic physics, the project aims to shed new light on how their weak and electromagnetic structure is generated, as well as the nature of baryon excited states. This project is expected to promote international collaboration and provide a rich, research intensive environment for training outstanding post-graduate students and research fellows.

DP150103875 Tibby, Dr John; Moss, Dr Patrick T; Leng, Prof Melanie; Shakun, Dr Jeremy; Spooner, Adj/Prof Nigel A

2015	\$161,745.00
2016	\$147,900.00
2017	\$71,495.00
Total	\$381,140.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The University of Adelaide

Project Summary

Before the arrival of Europeans, two events shaped Australia's current landscapes and biota more than any others: climate change during the glacial cycle and the arrival of humans on the continent. However, the full scale of these events is not well understood. High resolution analyses of two continuous 140 000 year old sediment deposits will be used in this project to fill this void and answer fundamental questions about how current Australian environments came to be.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100008 Varghese, Prof Mathai; Bouwknegt, Prof Peter

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$369,900.00

Primary FoR 0105 MATHEMATICAL PHYSICS

Administering Organisation The University of Adelaide

Project Summary

An abstract mathematical tool, called K-theory, has recently found application in two, not obviously related, areas of physics: the classification of D-branes in String Theory, and topological phases in Condensed Matter Theory. This project aims to advance the development of K-theory using ideas from physics. In particular, the project aims to generalise previous constructions, such as T-duality, to loop spaces, and to develop the K-theory relevant to the classification of topological phases in strongly interacting systems. This project involves postgraduate training as a crucial tool in achieving its aims and enhances Australia's position at the forefront of international research.

DP150103359 Veitch, A/Prof Peter J; Ottaway, Dr David J; Slagmolen, Dr Bram J; Brooks, Dr Aidan F; Ballmer, Asst Prof Stefan W; Adhikari, Prof Rana X

2015	\$175,000.00
2016	\$167,800.00
2017	\$128,000.00
Total	\$470,800.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Adelaide

Project Summary

Second-generation gravitational wave detectors that will directly detect gravitational waves for the first time are currently being assembled. Their sensitivity will be limited by intrinsic thermal motion of the atoms in the mirror coatings and the quantum nature of the laser beams in the detectors. This project aims to develop new designs with the aim of circumventing these limitations and developing the ultra-sensitive optical metrology required to realise those designs. It is expected that the increased sensitivity of these third-generation detectors will allow more detailed measurement of the gravitational wave signals and provide unprecedented understanding of some of the most violent events in the universe.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103851 Vokes, Dr Richard P

2015	\$51,703.00
2016	\$43,700.00
2017	\$30,437.00
Total	\$125,840.00

Primary FoR 1601 ANTHROPOLOGY

Administering Organisation The University of Adelaide

Project Summary

Antarctica is a unique scientific laboratory. It is the only continent historically uninhabited by humans; access to its vast land and ice-scapes, and its surrounding oceans, is today almost exclusively reserved for scientists. Although these 'Antarcticans' represent multiple disciplines, and pursue a wide variety of research agendas, their shared experiences of working on the continent, and their shared professional networks, mean that they constitute a distinct community of practice. However, this community has yet to be subjected to detailed ethnographic enquiry. This project aims to examine Antarctic scientists' research practices, and their cultures of knowledge production, through an ethnographic study of Australia's Davis Station.

DP150100411 Westra, Dr Seth; Johnson, Dr Fiona; Zwiers, Dr Francis; Fowler, Prof Hayley J; Lenderink, Dr Geert

2015	\$120,000.00
2016	\$95,900.00
2017	\$60,000.00
Total	\$275,900.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Adelaide

Project Summary

Climate change is causing extreme rainfall intensity to increase globally. The greatest increases occur for short-duration storms lasting up to several hours, bringing a heightened risk of flash-floods that are often extremely hazardous due to their rapid onset. The project aims to develop a new spatial extreme value framework to predict extreme rainfall patterns, using insights on future changes to rainfall triggering mechanisms (e.g. convective, frontal or orographic). The research aims to provide projections in the form of intensity-frequency-duration curves, areal reduction factors and antecedent rainfall depths. Engineers are expected to use this information to design infrastructure and urban planning policies to adapt to future flood risk.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of South Australia

DP150103658 Grant, Prof Alexander J; Chan, A/Prof Terence H; Ho, Dr Siu Wai; Dimakis, Asst Prof Alexandros; Yamamoto, Prof Hirosuke; Lee, Asst Prof Patrick Pak-Ching

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$110,000.00
Total	\$435,500.00

Primary FoR 0804 DATA FORMAT

Administering Organisation University of South Australia

Project Summary

Applications such as file sharing, large-scale scientific projects, and social networking are fuelling the need for reliable and sustainable distributed storage systems. This project aims to develop the theory and the code designs for next-generation storage systems that are specifically optimised for the storage needs in such applications. This project is well placed to provide cost-effective, home-grown solutions for Australia's future data centre needs. Its potential immediate benefits are: contribution to the knowledge base and fundamental capabilities in storage systems; practical codes tailor-made for different storage applications; IP creation and commercialisation; and, education of future Australian academic and industrial innovators.

DP150101674 Griesser, Prof Hans J; Coad, Dr Bryan R; Klok, Prof Harm-Anton; Read, Prof Nick

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
2018	\$30,000.00
Total	\$355,500.00

Primary FoR 0303 MACROMOLECULAR AND MATERIALS CHEMISTRY

Administering Organisation University of South Australia

Project Summary

This project aims to establish a scientific basis for the design and development of thin coatings, for use on biomedical devices, that can resist the attachment of fungal cells and the ensuing formation of infectious fungal biofilms on their surfaces. Advancing mechanistic understanding of how physico-chemical properties of materials surfaces influence fungal attachment will enable rational development and optimisation of coating chemistries and structures. Tethered antifungal compounds will be added to polymer surfaces by controlled polymerisation methods to provide active deterrence; factors such as conformational flexibility will be studied to optimise coatings, which may prevent life-threatening infections and reduce healthcare costs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100485 Luckman, A/Prof Susan H

2015	\$100,000.00
2016	\$115,100.00
2017	\$100,000.00
Total	\$315,100.00

Primary FoR 2002 CULTURAL STUDIES

Administering Organisation University of South Australia

Project Summary

The project aims to analyse a new workplace phenomenon: not simply the negotiation of work-life or public-private boundaries, but their deliberate collapse. Focussing on handmade creative micro-enterprise, it aims to identify the 'self-making' skills for success in the competitive 'long tail' craft marketplace. By examining the soft skills required to engage in online retail, the research aims to identify ways of improving the ability of creative Australians to run a micro-enterprise. It endeavours to advance the knowledge base of interdisciplinary scholarship on creative industries, cultural work, and on the impact of social media upon work/life relationships and personal privacy and identity construction.

DP150104212 Vasilev, A/Prof Krasimir A; Hayball, A/Prof John D

2015	\$125,000.00
2016	\$119,900.00
2017	\$85,000.00
Total	\$329,900.00

Primary FoR 0903 BIOMEDICAL ENGINEERING

Administering Organisation University of South Australia

Project Summary

The overarching aim of this project is to provide a mechanistic understanding of how surface nanotopography affects inflammatory responses. Experimental evidence demonstrates that engineered surface nanotopography in combination with surface chemistry downregulates the expression of proinflammatory cytokines from primary macrophages. The significance of these findings is that it may be possible to engineer the nanotopography of a biomedical device surface in a manner which leads to a desired and predictable level of inflammation and subsequent foreign body reaction (FBR) medical implants and tissue engineering constructs.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101774 Voelcker, Prof Nicolas H; Lombi, Prof Enzo; Roberts, Prof Michael S; Priest, Dr Craig I

2015	\$120,000.00
2016	\$118,000.00
2017	\$125,000.00
Total	\$363,000.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation University of South Australia

Project Summary

The nanotechnology sector is experiencing an exponential growth period with over 100 products containing manufactured nanoparticles entering the market every year. Ensuring growth of the sector needs to be balanced against the imperative of protecting both human and environmental safety. This project aims to develop new methodological and conceptual avenues to close the gap between innovation in nanotechnology and risk assessment. This is intended to be achieved by developing and validating high-throughput in vitro toxicity screening platforms for manufactured nanoparticles. The approach is based on advanced lab-on-a-chip microfluidic technologies. The predictive power of the platform will be refined and optimised via ex-vivo and in-vivo models.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Western Australia

Curtin University of Technology

DP150101708 Buckley, Prof Craig E; Silvester, Dr Debbie S; Jensen, A/Prof Torben R; Sheppard, Dr Drew A; Paskevicius, Dr Mark P

2015 \$105,000.00

2016 \$100,700.00

2017 \$105,000.00

Total \$310,700.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Curtin University of Technology

Project Summary

The storage of hydrogen is one of the most important issues that remains to be solved before the mass implementation of hydrogen as an energy carrier becomes commercially viable. This project aims to determine the kinetic and thermodynamic benefits of mesoporous metal scaffolds as reactive containment vessels for hydrogen storage materials. Fundamental experimental research into the synthesis, characterisation, and modification of nano-confined hydrogen storage materials will be carried out. The results of this research are expected to be used to tune hydrogen desorption temperatures and pressures of various light weight hydrogen storage materials to generate new materials attractive to the automobile industry.

DP150102773 Fitzsimons, Prof Ian C; Holness, Prof Marian; Clark, Dr Christopher F

2015 \$65,000.00

2016 \$52,700.00

2017 \$65,000.00

Total \$182,700.00

Primary FoR 0403 GEOLOGY

Administering Organisation Curtin University of Technology

Project Summary

Migration of volatile fluid and molten rock controls many Earth processes including rock deformation and the formation of mineral and energy deposits. Deep crustal fluids are hard to study directly, and their characteristics are usually inferred from lower crustal rock brought to the surface by erosion. For over 30 years one such rock called charnockite has been used to argue that lower crust is dehydrated by influx of carbon dioxide-rich fluid, while other evidence supports dehydration by water extraction in silicate melt. This project aims to use the shape, distribution and chemistry of mineral grains to trace the passage of volatiles and melt through charnockite, constrain the nature of lower crustal fluids and resolve a long-standing controversy.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102235 Grice, Prof Kliti; Bush, Prof Richard T; Visscher, Prof Dr Pieter T; Sessions, Prof Alex; Schwark, Prof Dr Lorenz

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0402 GEOCHEMISTRY

Administering Organisation Curtin University of Technology

Project Summary

This project will apply compound specific sulfur isotope analyses to sulfur-rich deposits from extreme environments including sulfidic black oozes (Peel-Harvey estuary); modern microbialites (for example, Shark Bay) and oils/source rocks (established and frontier oil fields). Sulfur isotopic data, integrated with other stable isotopic and molecular data, will greatly assist the study of sulfur biogeochemical cycles and mechanisms of organic sulfurisation at different diagenetic stages or geological ages. The project aims to address national concerns through measuring the respective impact of anthropogenic and natural changes on environments, helping to understand the evolution of life on Earth and contributing to efficient discovery of our natural petroleum systems.

DP150104346 Hao, Prof Hong

2015	\$160,000.00
2016	\$153,400.00
2017	\$140,000.00
2018	\$140,000.00
Total	\$593,400.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation Curtin University of Technology

Project Summary

Using precast segmental concrete columns in structures improves the construction efficiency and site safety, leads to better construction quality control, and reduces the construction cost, site disruption and environmental impacts. The performance of segmental columns to resist earthquake and blast loads is not well studied yet. As a structure might be subject to such loads during its service life, understanding its resistance capacities is essential for structural safety. This project aims to perform experimental and numerical investigations to study the performance of precast segmental concrete columns under earthquake and blast loads, and develop analytical and design methods for applications of such columns in building and bridge structures.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101198 Jalleh, A/Prof Geoffrey; Donovan, Prof Robert J; Gucciardi, Dr Daniel F; Dimeo, A/Prof Paul M; Barkoukis, Dr Vassilis; Kavussanu, Dr Maria

2015	\$112,785.00
2016	\$105,200.00
2017	\$30,000.00
Total	\$247,985.00

Primary FoR 1117 PUBLIC HEALTH AND HEALTH SERVICES

Administering Organisation Curtin University of Technology

Project Summary

This project builds on previous research that developed a psychological profile of athletes susceptible to doping. The primary objective is to refine and pilot an intervention involving psycho-educational activities and exercises that can be used to reduce an athlete's susceptibility to doping. Current anti-doping programs focus on knowledge of banned substances, reporting and testing requirements, and penalties for noncompliance. These programs ignore psychological variables that may render an athlete susceptible to doping. The successful application of the psychological anti-doping intervention is expected to provide an internationally significant contribution to doping prevention and the social science research on which it is based.

DP150102025 Jiang, Prof San Ping; De Marco, Prof Roland

2015	\$160,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$375,500.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation Curtin University of Technology

Project Summary

Proton exchange membrane fuel cells (PEMFCs) are one of the most efficient energy conversion technologies for producing electricity from fuels such as hydrogen and methanol. Current PEMFCs use precious metal catalysts, and the performance of liquid methanol fuel is disappointingly low due to the inability of polymer or hybrid membranes to operate at temperatures above 160-180 degrees centigrade. This work aims to develop an all oxide-based PEMFC technology using a recently developed sintered and heteropolyacid functionalised mesoporous silica membrane. The utilisation of all-oxide-PEMFCs using non-precious metal catalysts is expected to significantly enhance the power density, reduce costs, and enhance the commercial viability of PEMFC technologies.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102044 Jiang, Prof San Ping; Demichelis, Dr Raffaella; Liu, Prof Dr Chang

2015	\$135,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$330,900.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation Curtin University of Technology

Project Summary

The demand for clean, secure and sustainable energy sources has stimulated great interest in electrochemical energy storage and conversion technologies such as water splitting and fuel cells. The efficiency of water splitting and fuel cells is however strongly dependent on the activity of the electrocatalysts. The objective of the project is to develop new electrocatalysts based on the recently discovered phenomena that carbon nanotubes with specific size and number of walls are very active and significantly promote the reaction of water splitting and fuel cells. The proposed project is expected to open a new research field in the development of new electrocatalysts and photoelectrocatalysts for advanced energy conversion and storage technologies.

DP150101540 Lipp, Prof Ottmar V; Hess, Prof Ursula; Martin, A/Prof Frances H

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation Curtin University of Technology

Project Summary

The processing of facial expressions of emotion is essential for successful social functioning however our understanding of how these important signals are processed and of the factors which may impede appropriate processing is lacking. Using a range of converging methodologies drawn from neuroscience, social, and cognitive psychology, this project aims to advance our understanding of the processing of the expressions of two central social emotions, happiness and anger, by delineating the conditions that support or limit it in the general population. This research aims to provide an invaluable knowledge base for subsequent applied research into deficits of emotional expression processing such as occur in autism, anxiety, or old age.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103487 Marks, A/Prof Nigel A; Suarez-Martinez, Dr Irene; Buckley, Prof Craig E; Harris, Dr Peter J

2015	\$120,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$335,500.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Curtin University of Technology

Project Summary

For over 60 years it has remained a puzzle why some carbons graphitise under heating while others do not. The question is of practical importance as oxidation of non-graphitising carbons produces activated carbon, a product of high value with industrial, medical and environmental applications. Using computational and experimental techniques the project will study the graphitisation process and pinpoint the structural elements which inhibit it. Based on these findings the project aims to develop a nanoscale atomistic model for activated carbons. This is expected to be an important contribution to the field of chemical engineering in which current models of activated carbon neglect either curvature in the network or the presence of oxygen.

DP150104365 Shao, Prof Dr Zongping; Tade, Prof Moses O

2015	\$140,000.00
2016	\$134,300.00
2017	\$140,000.00
2018	\$50,000.00
2019	\$50,000.00
Total	\$514,300.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation Curtin University of Technology

Project Summary

Fuel cells are advanced energy conversion devices with high efficiency and low emissions. The overall goal of this project is to increase the competitiveness of the fuel cell technology with currently matured power generation technologies based on fossil fuel combustion through innovations. Both experimental development and modelling studies will be performed. It is expected that: reduced materials, fabrication and maintenance costs; improved performance; increased coking resistance and sulfur tolerance; and prolonged lifetime of solid oxide fuel cells will be achieved. This project endeavours to advance the field of electrochemical energy conversion. It is also expected to expand the science and engineering knowledge base and pave the way to sustainable energy systems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103026 Wang, Prof Shaobin; Tade, Prof Moses O; Sun, Dr Hongqi; Zhi, Prof Dr Linjie; Xu, A/Prof Rong

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$60,000.00
Total	\$415,100.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation Curtin University of Technology

Project Summary

This project aims to develop a novel material platform based on metal-free graphitic carbon nitride and its functionalised composites in solar energy utilisation for water treatment, energy conversion to hydrogen, solar cell, and electrochemical battery in energy storage. The project aims to address the scientific challenges in rational nanomaterial synthesis, functionalisation and practical applications. The research outcomes are expected to provide a scientific basis for development of cutting-edge nanotechnologies for sustainable energy transformation and wastewater treatment, leading to significant benefits in Australian energy industries and environment.

DP150104486 Wu, Prof Hongwei

2015	\$144,000.00
2016	\$81,500.00
2017	\$89,000.00
Total	\$314,500.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation Curtin University of Technology

Project Summary

This project aims to develop a novel technology from biomass pyrolysis for coproducing a diesel/biodiesel/bio-oil blend as a liquid transport fuel for local use and a high-quality bioslurry fuel suitable for transport to centralised stationary applications. The technology aims to address key issues associated with current biofuel production from biomass pyrolysis due to the undesired high acidity, poor stability and high oxygen content of bio-oil. The liquid transport fuel is expected to be produced without the expensive bio-oil hydrotreating for deep de-oxygenation, which is otherwise required for using bio-oil as feedstock in conventional petroleum refining process. Both biofuel products can be adoptable for wide applications in the existing vast infrastructure.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Edith Cowan University

DP150104734 Green, Prof Lelia R; Livingstone, Prof Sonia; Holloway, Dr Donell J; O'Neill, Dr Brian

2015 \$95,053.00

2016 \$105,300.00

2017 \$164,858.00

Total \$365,211.00

Primary FoR 2001 COMMUNICATION AND MEDIA STUDIES

Administering Organisation Edith Cowan University

Project Summary

Children aged between zero and five are experiencing an extraordinary shift in media consumption. They intuitively swipe screens and press buttons on tablet computers and smartphones, using apps and accessing the internet. With an estimated five-fold increase in their tablet usage (2012 to 2013), there is an urgent need for research and policy development to maximise benefit and minimise risk. This project is intended to investigate family practices and attitudes around very young children's internet use in Australia and the United Kingdom, and is expected to contribute to public debate and evidence-based policy in Australia, the United Kingdom and Ireland. It aims to develop recommendations for policy makers and offers guidelines for parents of three age groups: zero to one, two to three and four to five.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Murdoch University

DP150100217 Beeson, Prof Mark K; Wilson, Dr Jeffrey D; Li, Dr Fujian; Wang, Prof Yong

2015 \$47,776.00

2016 \$52,700.00

2017 \$53,942.00

Total \$154,418.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation Murdoch University

Project Summary

This project will analyse the bilateral economic relationship between Australia and China. The principal focus will be on how economic relations have been conditioned by distinctive patterns of economic and political organisation in each country. The approach will draw on and extend the Varieties of Capitalism literature to provide a detailed analysis of the institutional features of the Chinese and Australian economies, and how these institutions condition the economic relationship between the two. By analysing the different policymaking traditions and business structures the project aims to explain the challenges facing Australia-China economic ties, particularly over the minerals industry, foreign investment and free trade agreement negotiations.

DP150101142 Volet, Prof Simone E; Ritchie, Prof Stephen; Pino-Pasternak, Dr Deborah S; Vauras, Prof Marja; Tobin, Prof Kenneth G

2015 \$100,000.00

2016 \$95,900.00

2017 \$105,000.00

Total \$300,900.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation Murdoch University

Project Summary

Australia's challenges in regard to scientific literacy and growth of student enrolments in science need to be addressed at multiple levels, starting with the preparation of future primary teachers. Promoting children's early interest in inquiry-based science is essential, yet a challenge for many teachers. This project examines the complex and dynamic interplay of cognitive, metacognitive and emotional processes in future primary teachers' engagement in collaborative inquiry-based science activities. A comprehensive intervention based on these insights aims to determine how scaffolding productive engagement can improve the quality of primary teachers' preparation for inquiry-based science.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103124 Warren, Prof James F; Pearson, Em/Prof Michael N; Mullins, A/Prof Steve; Mhando, A/Prof Martin R; Coles, Mr Alec; Machado, Asst Prof Pedro A; Hopper, A/Prof Matthew; Suzuki, Dr Hideaki

2015	\$112,775.00
2016	\$169,800.00
2017	\$100,483.00
2018	\$55,000.00
Total	\$438,058.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation Murdoch University

Project Summary

This multidisciplinary project aims to be the first transoceanic investigation of pearl mining in the Indian Ocean World (IOW), focusing on the Red Sea, Persian Gulf, India/Sri Lanka, Sulu Sea and northern Australia. It will use commodity-based historical analyses and object-centred biographies to undertake comparative studies of labour systems, trade networks and the cultural value of pearls/pearl shell during an era marked by the spread of European imperialism and industrialisation. The project includes historical, ethnographic and film components and is expected to produce texts, films and museum displays. It is also designed to deliver a new understanding of the IOW past, and a new appreciation of Australia's place in IOW history.

DP150100906 Wilson, Prof Sandra S; Cribb, Prof Robert B

2015	\$46,500.00
2016	\$64,100.00
2017	\$30,000.00
Total	\$140,600.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation Murdoch University

Project Summary

During the Second World War, Japanese military forces in Asia and the Pacific committed extraordinary atrocities against prisoners-of-war, civilian internees and local populations. These atrocities shocked Japan's Western enemies, not least because Japanese military behaviour in the early 20th century had been celebrated as remarkably humane. This project seeks to explain Japanese wartime brutality, identifying the specific circumstances in which it occurred and considering the particular wartime context. It challenges the prevalent explanation of Japanese wartime violence which locates the causes of brutality in deeply rooted aspects of Japanese national culture. This research is expected to contribute to understandings of war and violence.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

The University of Western Australia

DP150102437 Andoniou, Dr Christopher; Degli-Esposti, Prof Mariapia A

2015	\$85,000.00
2016	\$81,500.00
2017	\$85,000.00
Total	\$251,500.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The University of Western Australia

Project Summary

Apoptosis is a form of cell death that is critical for the development and well-being of multicellular organisms. The activity of Bak or Bax, two members of the Bcl-2 family, are essential for apoptosis to proceed, but how the activity of these two proteins is regulated is unclear. Many viruses encode inhibitors of apoptosis and the project will make use of two novel viral inhibitors that specifically target Bak. The project aims to determine how the Bak inhibitors function and to provide valuable insights into the normal mechanisms regulating Bak activity.

DP150104839 Antoszewski, Prof Jarek; Umana-Membreño, Prof Gilberto A; Rogalski, Prof Antoni

2015	\$120,000.00
2016	\$115,100.00
2017	\$100,000.00
Total	\$335,100.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

Novel mercury cadmium telluride (HgCdTe) nBn (two n-type semiconductors sandwiching a barrier layer) infrared (IR) detectors are theoretically capable of operating at higher temperatures than conventional IR detectors. Their reduced cooling requirements lead to reductions in the size, weight and power of IR imaging systems without loss in IR detection performance. Unfortunately, HgCdTe nBn detectors are currently affected by non-ideal dark current and noise levels whose physical origins and nature are poorly understood. The proposed experimental and theoretical investigations and optimisations are anticipated to minimise such non-idealities and thus enable the demonstration of HgCdTe nBn IR detectors capable of revolutionising portable IR detection systems for security and rescue applications.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104251 Bennamoun, Prof Dr Mohammed; Boussaid, A/Prof Farid; Kendrick, Prof Gary A; Fisher, Dr Robert B

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
2018	\$120,000.00
2019	\$110,000.00
Total	\$614,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Western Australia

Project Summary

Ever expanding human activity coupled with climate change has severely damaged marine ecosystems, which play a key role in our planet's ability to sustain life. Yet automated technology to monitor the health of our oceans still does not exist, with marine scientists still having today to process manually a massive amount of raw underwater imagery. This research aims to address this bottleneck by developing advanced computer vision tools for rapid, large-scale, automatic identification of marine species. Such an automated technology is expected to greatly benefit marine ecological studies in terms of speed, cost, accuracy of the spatial/temporal sampling and thus in better quantifying the level of environmental change marine ecosystems can tolerate.

DP150100294 Bennamoun, Prof Dr Mohammed

2015	\$100,000.00
2016	\$115,100.00
2017	\$120,000.00
2018	\$120,000.00
2019	\$100,000.00
Total	\$555,100.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The University of Western Australia

Project Summary

This project addresses crucial limitations of existing vision systems for the robot grasping of irregular objects in messy living environments. This project aims to undertake fundamental research into novel three-dimensional vision algorithms, exploiting multiple modalities (two-dimensional+three-dimensional+video) for scene labelling, object classification, scene segmentation and grasp synthesis to enable future robots to operate in unstructured environments with highly occluded and cluttered objects. It is expected to significantly advance research and to have broad applications, including home robotics to improve the quality of life of elders and people with special needs. These algorithms may also be used in security (explosive manipulation) and agriculture (field crop harvesting).

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102692 Bond, Prof Charles S; Small, Prof Ian D

2015	\$130,000.00
2016	\$129,500.00
2017	\$135,000.00
2018	\$65,000.00
2019	\$65,000.00
Total	\$524,500.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Western Australia

Project Summary

Many plants maintain an elaborate RNA-editing machine that allows them to correct accumulated errors in their organellar genomes by specifically editing the RNA transcripts of the affected genes. A portable and adaptable version of this molecular machine would have significant biotechnological value, providing the ability to correct genetic errors, and to intervene in gene regulation without permanently altering a genome. The project aims to combine molecular and structural biology approaches to fully characterise the components of the machine, thus allowing us to reconstitute it in cell-free systems and ultimately in other organisms.

DP150104644 Cheng, Prof Liang; Zhao, Dr Ming; Draper, Dr Scott; Harris, Dr John; Whitehouse, Prof Richard

2015	\$140,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$414,300.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

This project aims to develop improved predictions and understanding of the potential and extent of scour and scour-induced settlement of subsea infrastructure on mobile seabeds. This is expected to enable scour and settlement to be accounted for directly in engineering stability and serviceability design, overturning current practice which ignores both effects on the basis of using scour protection and costly maintenance and remediation. Development of accurate predictions is expected to be achieved through physical model testing, numerical modelling and analysis of field data. Predictions should improve subsea reliability and lead to omission of scour protection in some situations, increasing international competitiveness of our offshore oil and gas industry.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103211 Considine, Asst Prof Michael J; Foyer, Prof Christine H; Colmer, Prof Timothy D; Gibbs, Dr Daniel J; Verboven, Dr Pieter; Considine, Prof John A

2015	\$120,000.00
2016	\$119,900.00
2017	\$145,000.00
Total	\$384,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Western Australia

Project Summary

Dormancy is an important economic and ecological trait of many trees and crop plants, including most commercially valuable fruit species. This project aims to: define oxygen and radicals of oxygen as central cues of grapevine bud development and dormancy; identify and model the developmental processes that occur during dormancy onset, maintenance and release (bud burst); as well as to identify the molecular and biochemical regulators of oxygen signals in bud dormancy. The knowledge generated could provide a platform to test impacts of climate change on fruit and tree species, and lead to better management of fruit and tree species in agricultural and ecological systems.

DP150103266 Evans, A/Prof Jonathan P

2015	\$100,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$295,900.00

Primary FoR 0602 ECOLOGY

Administering Organisation The University of Western Australia

Project Summary

This project aims to develop integrated approaches for understanding sexual selection at the level of the gamete. It will use a new and highly versatile model system - the blue mussel - to seek insights into how multivariate selection targets ejaculates, the dynamic nature of selection, and the putative role that chemical communication between eggs and sperm plays in mediating these processes. A range of interdisciplinary approaches will be used to uncover these patterns, and the mechanisms underlying them. By focusing on a species exhibiting the ancestral reproductive strategy of broadcast spawning, the work will contribute to an understanding of major evolutionary transitions in reproductive biology.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102449 Gaudin, Prof Christophe; Cassidy, Prof Mark J; O'Loughlin, A/Prof Conleth D; Hambleton, Dr James P

2015	\$210,000.00
2016	\$181,800.00
2017	\$180,000.00
Total	\$571,800.00

Primary FoR 0905 CIVIL ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

This project aims to establish a geotechnical design framework for shared anchoring systems subjected to multidirectional cyclic loading for large integrated arrays of floating wind turbines and floating wave energy converters. This is expected to facilitate new, economic foundation solutions, generating radical cost savings to help unlock Australia's renewable ocean energy resources. The project aims to utilise a blend of state-of-the-art centrifuge modelling techniques and numerical modelling, incorporating an energy-based method and yield envelopes. This innovative methodology aims to establish a validated framework for understanding and predicting foundation performance under the complex load histories arising in renewable ocean energy applications.

DP150102638 Ghisalberti, A/Prof Marco; Ivey, Prof Gregory N; Nepf, Prof Heidi; Karniadakis, Prof George; Shimeta, Dr Jeffrey S

2015	\$95,000.00
2016	\$91,100.00
2017	\$100,000.00
Total	\$286,100.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

This project investigates the fundamental fluid mechanics of particle capture, whereby suspended particles contact and adhere to a solid structure. This process is examined in productive and biodiverse ecosystems (such as coral reefs and seagrass meadows) whose health, productivity and propagation are directly controlled by particle capture. Existing formulations for particle capture are valid only under highly idealised conditions that are grossly unrepresentative of the complexity of ecosystem flows. The goal of this project is to use a coupled computational-experimental campaign to develop predictive capability for particle capture in ecosystems, where the flow can be turbulent and/or wave-dominated and the biological structures complex.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101066 Giudici, A/Prof Michael R; Li, Prof CaiHeng; Verret, Dr Gabriel

2015	\$125,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$369,900.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The University of Western Australia

Project Summary

Highly symmetrical graphs are well-studied and, in many respects, the theory for dealing with them is well-established. By comparison, our understanding of symmetrical digraphs is much poorer. There are some rather basic questions about these about which we know shamefully little. The aim of this project is to remedy this shortage of knowledge by extending many important results and theories about symmetrical graphs to digraphs.

DP150103880 Imberger, Prof Jorg; Marti, A/Prof Clelia L

2015	\$180,000.00
2016	\$134,300.00
2017	\$30,000.00
Total	\$344,300.00

Primary FoR 0499 OTHER EARTH SCIENCES

Administering Organisation The University of Western Australia

Project Summary

The aims of this project are to determine parametric descriptions of all transport and mixing mechanisms and their interactions in a stratified lake, validate these parameterisations through process fieldwork (Lake Argyle and Lake St Clair) and then use this understanding to validate and improve a new Lagrangian Dynamic Lake Multi-Basin Model. This project will endeavour to provide lake managers with a new, validated numerical model that will allow inter-seasonal simulations with the numerical error being less than the signal. This will be of great importance to ecology, as future advances in that area will largely depend upon a model with correct description of the mass flux paths in a stratified lake.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102405 Ji, Dr Meng; Togneri, Prof Roberto; Liu, Dr Wei; De Sutter, Prof Dr Gert; Díaz Cintas, Reader Jorge; Laviosa, Dr Sara; Pagano, A/Prof Adriana S; Wright, Prof Dr Sue-Ellen

2015	\$194,950.00
2016	\$156,300.00
2017	\$158,600.00
Total	\$509,850.00

Primary FoR 2003 LANGUAGE STUDIES

Administering Organisation The University of Western Australia

Project Summary

This project aims to tackle the pressing issue of the social invisibility of the translation profession, a persistent social problem that threatens to hinder the development of a critical knowledge-based industry in Australia within a rapidly changing international social, economic and cultural context. The project is expected to offer insights into the emerging international translation system and inform policy makers and the general public about the challenges and opportunities of developing this profitable and resilient service industry.

DP150104117 Koutsantonis, Prof George A; Nichols, Prof Richard J; Kaupp, Prof Dr Martin

2015	\$140,000.00
2016	\$134,300.00
2017	\$130,000.00
Total	\$404,300.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The University of Western Australia

Project Summary

Electronics technology is coming up against significant fabrication challenges. The international semiconductor community has identified molecular electronics and molecular switches as potential future technologies that can help to alleviate these growing integration challenges. This project will explore and develop a number of novel molecular switches to meet this coming need. The switches will be assessed and screened through spectroelectrochemical and computational studies of intramolecular electron transfer in mixed-valence model complexes, before migrating the most promising designs into metal-molecule-metal junctions for further assessment.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101037 Ludwig, Dr Martha; Atwell, A/Prof Brian J; Lunn, Dr John E; Stitt, Prof Mark

2015	\$158,000.00
2016	\$146,700.00
2017	\$134,000.00
Total	\$438,700.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Western Australia

Project Summary

This project aims to identify the specific biochemical and underlying molecular modifications that contributed to the evolution of the C4 pathway by studying C3, C4 and C3-C4 intermediate Flaveria species. Most land plants use C3 or C4 photosynthesis to assimilate CO₂. Plants using the C4 pathway evolved from C3 ancestors in multiple plant lineages, and show higher rates of photosynthesis and conversion of solar radiation to biomass in arid, high-light and saline environments, which are expanding due to global climate change. The outcomes of this project could define what is required to engineer plant varieties with increased yield and the ability to withstand effects of climate shift, and contribute to our understanding of convergent evolutionary processes.

DP150100341 May, Prof Eric F; Aman, Asst Prof Zachary M; Sloan, Prof Earle D; Sum, Prof Dr Amadeu K; Koh, Prof Carolyn

2015	\$200,000.00
2016	\$182,200.00
2017	\$150,000.00
2018	\$150,000.00
Total	\$682,200.00

Primary FoR 0904 CHEMICAL ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

Increasing the allowable water content during the pipeline transportation of carbon dioxide (CO₂) would greatly increase the viability of carbon capture and storage but would also increase the risk of CO₂-hydrate blockages. Subsea methane (CH₄) hydrate sediments represent a tremendous new energy resource if blockages in production pipelines can be avoided. Conventional oil industry approaches to hydrate avoidance are of limited relevance and too expensive for these new applications. Formation probability distributions, cohesive forces and agglomeration tendencies of CO₂ and CH₄ hydrates are intended to be measured and integrated into predictive multi-phase flow models, enabling quantitative risk assessments of blockages in CO₂ transport or hydrate production pipelines.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104660 McLaughlin, A/Prof Robert A; Wilson, Prof Brian C

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0903 BIOMEDICAL ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

This project aims to create new tools to quantify the structural and functional properties of tissue. Combining multiple optical imaging technologies (multi-modal) into a single, miniaturised probe, these tools could enable physiologists and biomedical researchers to obtain new insight into disease. Encasing the highly miniaturised probe within a medical needle is aimed to allow insertion of the 'needle probe' deep into tissue, extending optical imaging to areas not previously accessible. The project could develop novel quantification models to allow longitudinal assessment and comparison between subjects. Validating the tools with specific biomarkers, it could provide outcomes in breast and liver cancer, and a framework to explore other diseases.

DP150100293 Murcha, Dr Monika W; Soll, Prof Juergen; Drouard, Dr Laurence

2015	\$110,000.00
2016	\$95,900.00
2017	\$100,000.00
Total	\$305,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The University of Western Australia

Project Summary

Mitochondria are essential organelles involved in energy production and specific metabolic pathways in plant cells that require the import of cytosolic transfer RNA (tRNA) to function. To date our knowledge on the mechanisms of tRNA import is limited. This project seeks to characterise putative receptors and mechanisms with the purpose of exploiting these insights to allow for the manipulation and modification of macromolecule targeting to mitochondria. The ability to modify or alter mitochondrial biogenesis and activity may allow for new approaches to be undertaken to increase plant growth, productivity and resistance to stress.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103312 Parker, Prof Sharon K; Dunlop, Asst Prof Patrick D; Straker, Prof Leon; Parkes, A/Prof Katharine R

2015	\$162,000.00
2016	\$63,300.00
2017	\$73,000.00
2018	\$35,819.00
Total	\$334,119.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Western Australia

Project Summary

Work design is critical for social and economic outcomes, as exemplified by the International Labour Office's 'Decent Work agenda'. This project first proposes new, long-term dynamic processes by which personality and demographics, and their interactions, shape or constrain individuals' opportunities for high quality work. Second, it considers how family, education, and workplace factors mitigate the pathways between these individual variables and work design. Finally, taking account of contemporary challenges in today's organisations, it examines how work design affects the person, including their health, performance, behaviour, and cognition. The project aims to address these questions using a unique longitudinal cohort study, the Raine Study.

DP150104219 Schilizzi, A/Prof Steven G; Rolfe, Prof John C; Boxall, Prof Dr Peter C; Latacz-Lohmann, Prof Uwe

2015	\$229,000.00
2016	\$80,600.00
2017	\$61,000.00
Total	\$370,600.00

Primary FoR 1402 APPLIED ECONOMICS

Administering Organisation The University of Western Australia

Project Summary

Economic theory and case study evidence show that tenders or auctions are more efficient than grant mechanisms for encouraging landholders to produce environmental outcomes on private land. These studies have ignored the effects of uncertainty of both bidders and administrators about factors such as landholder participation and the level of environmental benefits that will be delivered. This project will test whether distributing environmental funds via tenders is still efficient when uncertainty about various important factors is considered. Results from this research are expected to inform the cost effective design of systems to pay landholders for the provision of environmental benefits even when there is high uncertainty.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104433 Swaminatha-Iyer, Dr Killugudi L; Blancafort, A/Prof Pilar; St Pierre, Prof Timothy G; Saunders, Prof Martin; Stubbs, A/Prof Keith A; Dobson, Prof Jon

2015	\$177,000.00
2016	\$150,600.00
2017	\$157,000.00
Total	\$484,600.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The University of Western Australia

Project Summary

The success of genetic engineering is largely dependent on the ability of transfection agents to deliver genes. Low transfection efficiency is now widely recognised as a critical bottleneck to successful gene delivery. The recent emphasis on the development of nanoscale delivery agents has led to new physics and chemistry-based techniques, which take advantage of charge interactions and energetic processes. This multidisciplinary project aims to address this highly significant problem by developing a novel methodology to manipulate nanoparticles under the influence of an oscillating magnetic field to achieve high transfection efficiencies in a highly relevant model of epigenetic reprogramming.

DP150104580 Tonts, Prof Matthew A; Plummer, Prof Paul S; Argent, A/Prof Neil M

2015	\$68,113.00
2016	\$96,700.00
2017	\$118,069.00
2018	\$74,408.00
Total	\$357,290.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation The University of Western Australia

Project Summary

Understanding the ways in which Australia's rural heartland has been transformed is critical to constructing competitive regions. This project aims to pioneer the application and development of evolutionary economic geography and staples theory to an investigation of the transformation of south-east and south-western Australia, covering the long boom of the post-war period, through the restructuring 'crisis' of the 1980s and 1990s, to a multifunctional countryside. The explanatory power of the local modelling 'tools' that this project is expected to develop moves beyond the 'one size fits all' suite of policy prescriptions, with the specific potential to inform rural and regional policy and practice.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103903 Van Gent, Dr Jacqueline

2015	\$30,000.00
2016	\$30,000.00
2017	\$30,000.00
2018	\$96,000.00
2019	\$84,000.00
Total	\$270,000.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The University of Western Australia

Project Summary

Christianity became remarkably successful across an incredibly wide range of early modern cultures, languages and early modern colonial contexts - from Caribbean slavery to settler societies like Australia. How did this happen? This project uses the case study of early modern Moravian missions, a global and arguably one of the leading Protestant mission organisations in the early modern world, to reconceptualise the agency of indigenous people in shaping global Christianity. The project aims to explore the exceptionally diverse Moravian sources including mission diaries, correspondence, art, mission journals and even letters written by indigenous converts.

DP150100635 Wallace, A/Prof Vincent P; MacPherson, Asst Prof Emma; Gibson, Dr Adam

2015	\$120,000.00
2016	\$115,100.00
2017	\$120,000.00
Total	\$355,100.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The University of Western Australia

Project Summary

Terahertz (THz) technology is in use in diverse applications from security screening to biomedical imaging. A critical hurdle to the widespread adoption of the technology is the poor understanding of the basic interaction between THz radiation and hydrated materials. The aim of this project is to develop new mathematical and computer models for exploring the interaction of THz radiation with different materials. These models aim to create a platform for the future development of THz technology and applications, and are expected to lead to accelerated implementation for use in biology and protein analysis; pharmaceutical sciences, formulations and medicine; and burn assessment and cancer detection.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102988 **Wen, Prof Linqing; Hobbs, Dr George; Manchester, Dr Richard N; Kramer, Prof Dr Michael; Li, Asst Prof Kejia**

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The University of Western Australia

Project Summary

This project aims to contribute to one of the most significant breakthroughs in science - the direct detection of gravitational waves. It will develop innovative techniques to detect and localise gravitational waves in the nanohertz frequency band from radio timing data of millisecond pulsars. The technique developed by this project will help maximise the scientific output of Australia's legendary Parkes Radio Telescope, and boost the opportunities of the first detections of gravitational waves using the upcoming radio telescopes, Five hundred meter Aperture Spherical Telescope (FAST) and Square Kilometre Array (SKA).

DP150102564 **White, Prof Robert S**

2015	\$46,000.00
2016	\$45,900.00
Total	\$91,900.00

Primary FoR 2005 LITERARY STUDIES

Administering Organisation The University of Western Australia

Project Summary

The primary aim of this proposal is to research and publish the first sustained critical study of John Keats's important collection of poems, 'Lamia, Isabella, The Eve of St Agnes, And Other Poems' (1820). Considered as a volume in its own right, the collection exhibits principles of thematic and aesthetic unity as yet unnoticed. Whereas other books on Keats's poetry invariably deal with individual poems in the chronological order of their composition, this project aims to focus on Keats's shaping of the contents into a considered structure, grounded in themes that create a unified whole and provide a new context for the individual poems.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102422 Yeo, Prof Gillian B; Griffin, Prof Mark A

2015	\$80,000.00
2016	\$76,700.00
2017	\$80,000.00
Total	\$236,700.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The University of Western Australia

Project Summary

Organisations increasingly rely on action teams - those that form swiftly to tackle urgent, potentially dangerous incidents that unfold rapidly in uncertain environments. Effective leadership is critical for managing teams in such dynamic situations. However, little is understood about the dynamic behaviours required of action team leaders to effectively manage goal-directed action. The project will integrate self-regulation, team leadership and team theories to propose when team leaders should perform various behaviours and for how long, in order to develop the team states required for effectiveness. The project will then test the model with Incident Command and Surgical teams. Results aim to uncover prescriptive guidelines for the training and management of action team leaders.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Tasmania

University of Tasmania

DP150100345 Bowie, A/Prof Andrew R; Chase, Dr Zanna; Trull, Prof Thomas W; Tagliabue, Dr Alessandro

2015 \$100,000.00

2016 \$93,400.00

2017 \$40,000.00

Total \$233,400.00

Primary FoR 0405 OCEANOGRAPHY

Administering Organisation University of Tasmania

Project Summary

The scarcity of iron limits biological productivity and carbon uptake in the nutrient rich waters of the Southern Ocean. This project will explore for the first time the role of undersea "hot spot" volcanoes in supplying iron to surface waters, thus linking the solid earth and the biosphere. The project will measure iron abundance, reactivity and nutritional value in buoyant plumes emanating from vents near Heard/McDonald Islands, Australia's only active volcanoes. The project aims to estimate the hydrothermal contribution to regional biological productivity and extrapolate to the whole Southern Ocean. Successful outcomes will benefit Australia by identifying iron sources that govern productivity and carbon uptake of an economically important ecosystem.

DP150101777 Bowman, Prof David M; Murphy, Dr Brett P

2015 \$82,251.00

2016 \$127,400.00

2017 \$66,712.00

Total \$276,363.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation University of Tasmania

Project Summary

This project aims to document historical changes in the spatial grain of the patch burning mosaic in an Arnhem Land savannah with an unbroken history of management by Aboriginal people, and in adjacent areas where traditional management has ceased. The mosaic's spatial grain will be inferred by mapping the individual ages of the long-lived conifer *Callitris intratropica*. Prior research has shown that *Callitris* individuals can be reliably aged, and population structures are very sensitive to fire regimes: saplings only establish if unburnt for 10 years. This research is expected to provide the first direct test of the hypothesis that Aboriginal people maintained fine-grained fire mosaics in savannas, and inform bushfire policy debates.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100998 Breadmore, Prof Michael C; Guijt, Dr Rosanne M; King, Dr Anna E; Dickson, A/Prof Tracey C; Wheeler, Prof Bruce C

2015	\$200,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$415,500.00

Primary FoR 0399 OTHER CHEMICAL SCIENCES

Administering Organisation University of Tasmania

Project Summary

Understanding the organisation, structure and mechanisms of the human brain and nervous system remains one of the biggest challenges of science. This project aims to develop a new cell culture platform to form defined molecular networks of brain cells and to monitor changes throughout the network in response to a small localised injury within the network. This innovative platform will be used to help understand changes within cells in response to physical damage to networks of brain cells. This is one of the major causes of death and disability in developed nations, and is identified as a risk factor for a range of neurodegenerative diseases including Alzheimer's, Parkinson's and motor neuron disease.

DP150100088 Holland, A/Prof Barbara R; Sumner, Dr Jeremy G; Jarvis, Dr Peter D; Liberles, A/Prof David

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation University of Tasmania

Project Summary

To make sense of the patterns they see in the natural world, biologists across fields as diverse as genetics, epidemiology and biogeography need an accurate picture of evolutionary history. DNA sequences provide an exciting means to establish this picture of the past, but to decode it successfully requires mathematical models of how DNA evolves. Mathematical inconsistencies have been identified with current approaches. In particular, understanding the effect of natural selection in different parts of the tree of life requires models that behave robustly in the face of shifting evolutionary processes. This project aims to use insights from algebraic methods to construct mathematically consistent models of wide biological utility.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102426 Hovenden, A/Prof Mark J

2015	\$110,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$315,700.00

Primary FoR 0703 CROP AND PASTURE PRODUCTION

Administering Organisation University of Tasmania

Project Summary

The rising atmospheric concentration of carbon dioxide provides an opportunity to increase ecosystem productivity, especially in agricultural systems. To what extent is highly uncertain, particularly when combined with changing temperature and precipitation. It has recently been demonstrated that seasonal water supply is the strongest controller of the productivity response to high carbon dioxide concentrations of grasslands. This project aims to elucidate the processes governing this response and develop simple models that could allow the conditions required to maximise the productivity benefit from rising carbon dioxide concentration to be calculated.

DP150100615 King, Prof Matt; Watson, Dr Christopher S; Church, Dr John A; Deng, Dr Xiaoli; Hunter, Dr John R; Coleman, Prof Richard; Andersen, Dr Ole B

2015	\$133,000.00
2016	\$127,500.00
2017	\$175,000.00
Total	\$435,500.00

Primary FoR 0909 GEOMATIC ENGINEERING

Administering Organisation University of Tasmania

Project Summary

Multi-decadal changes in sea-level, and sea-level extremes, cannot be well quantified along most global coastlines, including Australia's, because the high spatial variability of sea-level is under-sampled by the sparse set of long, high quality tide gauge records. Satellite altimetry provides an alternative data source with greater spatial sampling, yet experiences contamination from land within tens of kilometres from the coast and also suffers from regionally correlated biases. This project proposes to address these problems through re-tracking radar altimetry waveforms to derive new data in the coastal margin, enabling the production of new inferences on sea-level change and extremes at dramatically improved spatial resolution around Australia.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102578 Large, Prof Ross R; Danyushevsky, Prof Leonid V; Halpin, Dr Jacqueline A; Meffre, Dr Sebastien

2015	\$167,000.00
2016	\$161,100.00
2017	\$153,000.00
Total	\$481,100.00

Primary FoR 0403 GEOLOGY

Administering Organisation University of Tasmania

Project Summary

Surprisingly little is known about trace element trends in past oceans, even though these data are vital for interpreting the evolution of the Earth's atmosphere, evolutionary pathways of marine life and cycles of major mineral deposits. Using laser-based analysis of sedimentary pyrite in deep marine rocks, this project aims to produce, for the first time, temporal variation curves for 25 trace elements in seawater over the last 3.5 billion years. Preliminary research has validated the technique and demonstrated major changes in certain trace elements over geologically short periods. Outcomes will assist the minerals industry in the discovery of new deposits of zinc, copper, gold and iron ore in Australia.

DP150103454 Lester, Prof Elizabeth

2015	\$60,000.00
2016	\$57,500.00
2017	\$60,000.00
2018	\$60,000.00
Total	\$237,500.00

Primary FoR 2001 COMMUNICATION AND MEDIA STUDIES

Administering Organisation University of Tasmania

Project Summary

Conflict over environments, resources and landscapes has become a feature of contemporary political life. Increasingly, these conflicts are articulated, negotiated and potentially resolved across national boundaries and complex networks of media and communications. In the context of intensifying pressure for resource access, market opportunities and changing media practices in Australia and the Asian region, it is critical to examine how competing environmental claims are mediated, and how this mediation influences public debate, policy and market viability. Providing evidence-based analysis of transnational conflicts as they emerge and travel, this project is expected to inform debate on Australia's environmental and economic sustainability.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102608 Nesterenko, Prof Pavel N

2015	\$145,000.00
2016	\$139,100.00
2017	\$50,000.00
Total	\$334,100.00

Primary FoR 0301 ANALYTICAL CHEMISTRY

Administering Organisation University of Tasmania

Project Summary

This project aims to develop a new generation of mechanically and thermally stable carbon-nanocarbon composite adsorbents for ultra-high-performance liquid chromatography. The structure of adsorbents will be constructed according to advanced core-shell design with non-porous carbon central core and porous shell formed by highly ordered uniform nanocarbon particles. The unique properties of carbon-nanocarbon composite adsorbents will put liquid chromatography to qualitatively new levels of the separation performance that may open new possibilities for medicine and biodiagnostics. The resulting technology also has a strong potential to be used in other priority areas such as preparation of electrodes and supercapacitors for energy storage devices.

DP150101005 Reading, Dr Anya M; Koper, A/Prof Keith D

2015	\$128,000.00
2016	\$112,200.00
2017	\$128,000.00
Total	\$368,200.00

Primary FoR 0404 GEOPHYSICS

Administering Organisation University of Tasmania

Project Summary

This project aims to improve our understanding of the severe ocean storms that impact Australia. The novel approach will make use of multiple decades of the background 'noise', recorded continuously by earthquake seismic observatories, to locate and analyse ocean storms through time and identify changes in storm tracks. An interdisciplinary interpretation will follow which combines the large body of new results from seismology with data from oceanography and meteorology. Significant advancement in our knowledge of severe storms will benefit Australia by indicating whether such storms are becoming more severe or, alternatively, if storm patterns are shifting.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101663 Shabala, Prof Sergey; Hedrich, Prof Rainer

2015	\$124,000.00
2016	\$120,800.00
2017	\$126,000.00
2018	\$32,000.00
Total	\$402,800.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation University of Tasmania

Project Summary

In this project, the key transport systems mediating salt sequestration in halophytes are planned to be characterised and linked with cell genetic and metabolic profiles. Salinity is a major environmental hurdle affecting crop production around the world. Halophytes (naturally salt-loving plants) use specialised structures, called salt bladders, to sequester excessive salt outside their metabolically active parts. This feature is not utilised by crops however, and no information is available about the molecular mechanisms by which salt is pumped into bladder cells. This knowledge will allow breeders to utilise this, previously unexplored, trait to improve crop performance under conditions of salinity.

DP150102900 While, Dr Geoffrey M; Chapple, Dr David G; Gardner, Dr Michael G; Uller, Dr Tobias; Cornwallis, Asst Prof Charlie K

2015	\$102,000.00
2016	\$112,200.00
2017	\$120,000.00
Total	\$334,200.00

Primary FoR 0602 ECOLOGY

Administering Organisation University of Tasmania

Project Summary

This project plans to connect micro-evolutionary processes with macro-evolutionary change to provide a unified understanding of why animals live together. Evolutionary transitions to and from complex social behaviour appear linked to female multiple mating (polyandry). However, the causal pathway by which variation in polyandry results in the emergence and diversification of sociality is yet to be established. Using a vertebrate system we aim to integrate empirical, theoretical and comparative approaches to show: the ecological causes of individual variation in female polyandry; its effect on social behaviours that promote social complexity at the population level; and how this corresponds to divergence in social complexity across species.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Northern Territory

Charles Darwin University

DP150103437 Mitchell, Prof William F; Stimson, Prof Robert J; Baum, Prof Scott W

2015 \$125,619.00

2016 \$121,500.00

2017 \$131,699.00

Total \$378,818.00

Primary FoR 1604 HUMAN GEOGRAPHY

Administering Organisation Charles Darwin University

Project Summary

This project aims to explain the changing patterns of regional economic performance across Australia between 2001-2011 in the context of two developments: major structural shifts in world trade and commodity prices spawning massive mining growth and negative exchange rate impacts elsewhere (for example, manufacturing); and the financial crisis ending the credit boom leaving east coast economies struggling. The resulting regional disparities have policy implications for education and skills training, housing affordability, infrastructure provision, and community sustainability. These issues will be investigated using a new functional economic regions geography and state of art spatial modelling tools supplemented by regional case studies.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

Australian Capital Territory

The Australian National University

DP150102057 Akhmediev, Prof Dr Nail N

2015 \$120,000.00

2016 \$115,100.00

2017 \$120,000.00

Total \$355,100.00

Primary FoR 0205 OPTICAL PHYSICS

Administering Organisation The Australian National University

Project Summary

This project builds on previous work in which the existence of exploding solitons was confirmed. Explosions occur regularly in a variety of systems with continuous supply and dissipation of energy. Exploding solitons are more common than ordinary dissipative solitons and occupy large areas in the parameter space. They can be generated relatively easily, however the phenomenon is highly complex. This project aims to further understand exploding solitons so that the phenomenon can be used for the generation of pulses with wide spectral output similar to 'supercontinuum' radiation. Research in this direction will provide the basis for building powerful laser sources with wide spectral output.

DP150100250 Asplund, Prof Martin; Casagrande, Dr Luca; Christensen-Dalsgaard, Prof Jorgen

2015 \$150,000.00

2016 \$115,100.00

2017 \$120,000.00

Total \$385,100.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The Australian National University

Project Summary

By developing state-of-the-art stellar atmosphere and evolution models, the project will endeavour to answer some of the key outstanding questions in stellar astrophysics including how magnetic fields are manifested in stars, how stars are affected by convection, how oscillations are excited in stars and how old the most ancient stars in the Milky Way are. The project will endeavour to make obsolete the free parameters that have hampered stellar modelling for the past half-century. Using unique stellar models the project aims to provide rich legacy resources for countless studies in modern astronomy and provide the necessary theoretical underpinning for ambitious Australian-led Milky Way surveys, such as GALAH and SkyMapper, and international satellite missions such as Kepler, TESS and PLATO.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104437 Ball, Prof Marilyn C; Lovelock, Prof Catherine E; Oliveira, Prof Rafael; Sack, Dr Lawren; Mencuccini, Prof Maurizio

2015	\$144,000.00
2016	\$141,900.00
2017	\$143,000.00
Total	\$428,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to combine cutting-edge analytical and imaging techniques to assess contributions of atmospheric water sources to shoot-water balances, identify leaf traits associated with top-down rehydration, and determine the relative importance of different sources of water used by mangroves in maintenance of photosynthetic carbon assimilation along natural gradients in salinity and aridity. The capacity of shoots to absorb atmospheric water could profoundly affect the diversity, survival and productivity of mangroves where high soil salinity limits water uptake by roots, particularly during hot, dry conditions.

DP150101947 Banwell, Prof Martin G

2015	\$140,000.00
2016	\$134,300.00
2017	\$150,000.00
2018	\$150,000.00
2019	\$125,000.00
Total	\$699,300.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation The Australian National University

Project Summary

Enzyme- and metal-catalysed processes will be developed and exploited for the purpose of establishing concise syntheses of biologically active and otherwise inaccessible natural products and their analogues. The range of structures to be targeted is structurally diverse and these have the potential to act as agrochemicals and/or as therapeutic agents for the treatment of a range of disease states in mammals including bacterial and viral infections, neuro-degenerative conditions and impaired cognitive function. Anti-angiogenic compounds that control otherwise unregulated cellular growth may also arise from these studies. The generation of new, homochiral metabolites for use in chemoenzymatic synthesis should also emerge from this project.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102392 Borger, Dr James M

2015	\$110,000.00
2016	\$100,700.00
2017	\$110,000.00
Total	\$320,700.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The Australian National University

Project Summary

This project aims to continue the development of arithmetic algebraic geometry. This is the field of fundamental mathematics that forms the basis for much of cryptography and coding theory, which are the fields of applied mathematics that allow for secure and efficient electronic communication. The approach will be to apply recent advances in the theory of global Witt vectors to resolve some open questions involving numerical properties of polynomial equations. This is expected to lead to advances in a field which is of fundamental importance in mathematics generally and which is also the basis of secure internet communication.

DP150101521 Buckman, Prof Stephen J; Sullivan, A/Prof James P

2015	\$130,000.00
2016	\$115,100.00
2017	\$110,000.00
Total	\$355,100.00

Primary FoR 0202 ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS

Administering Organisation The Australian National University

Project Summary

This project will apply new, state-of-the-art experimental positron technology in order to gain a deeper understanding of correlations in positron-atom and/or positron-molecule collision systems. The ambitious experimental program will investigate several of the major remaining 'big' questions in positron science. It is expected that the experimental evidence provided for processes such as threshold ionisation, positron bound states, and other positronic complexes, will stimulate theoretical calculations in the field and lead to new insights into a number of quantum scattering processes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100298 Cockburn, Prof Andrew; Kruuk, Prof Loeske E; van de Pol, Dr Martijn

2015	\$135,604.00
2016	\$123,100.00
2017	\$128,358.00
2018	\$128,358.00
Total	\$515,420.00

Primary FoR 0602 ECOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to combine unique long-term data with a novel Citizen Science approach to seek to provide the first complete test of the hypothesis that inbreeding avoidance can cause one of the best known patterns in mammal and bird societies - sex differences in when and how far juveniles disperse. Dispersal is a critically important ecological and evolutionary process, as it influences the fate of populations, and also determines the individuals with which a disperser will spend the remainder of its life. It therefore shapes the likelihood that kin will interact to cooperate or compete, and determines the pool of individuals with which the disperser can mate.

DP150104454 Coote, Prof Michelle L

2015	\$165,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$409,900.00

Primary FoR 0303 MACROMOLECULAR AND MATERIALS CHEMISTRY

Administering Organisation The Australian National University

Project Summary

Radical polymerisation is the most commercially important polymer process, favoured by industry for its broad scope and relatively low cost and environmental impact. However, its use in the synthesis of 'smart materials' for biomedical applications, molecular electronics and high-performance engineering applications has been hampered by the lack of microstructural control. This project aims to use a complementary combination of theory and experiment to develop novel structured Lewis acids for controlling the stereochemistry in free-radical polymerisation, and to utilise the recently discovered propagation catalysis conferred by simple Lewis acids to minimise defect structures and thereby improve the thermal and photostability of polymers.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104389 Corn, A/Prof Aaron D; Morphy, Prof Howard; Myers, Prof Fred R

2015	\$185,628.00
2016	\$151,400.00
2017	\$144,738.00
Total	\$481,766.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The Australian National University

Project Summary

The Aboriginal Artists Agency (AAA) was a driving force for change in the Australian arts industry. Founded in 1976, it was the first national body to administer copyrights for indigenous artists, create international demand for Australian culture and pioneer ways for Indigenous artists to reach audiences and markets worldwide. This project aims to investigate the seminal work of the AAA, secure and analyse its exclusive primary collection and assess the vast corporate knowledge of its personnel through new interviews. New frameworks for assessing Indigenous arts initiatives, it is hoped, will be generated through this unprecedented analysis of the AAA's role in reshaping attitudes towards Australian identities.

DP150104331 Cuevas, Prof Andres; De Wolf, Dr Stefaan

2015	\$150,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$443,900.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The Australian National University

Project Summary

This project aims to develop novel silicon heterojunction solar cells based on transparent conductive metal oxides (TCOs). Thin layers of zinc, gallium and molybdenum oxides present negligible absorption losses, which leads to a high output current. The project will optimise them as surface passivating layers, to achieve a high output voltage. TCOs can also provide good lateral conductivity, to boost the fill factor. The research proposes to create insight into the physical mechanisms of selective contacts for electrons and holes, paving the way for a range of innovative solar cell concepts. Transparent metal oxides open new windows of opportunity to increase the conversion efficiency of silicon solar cells using simpler fabrication processes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103294 Da Costa, Prof Gary S; Bessell, Prof Michael S; Schmidt, Prof Brian P

2015	\$130,000.00
2016	\$124,700.00
2017	\$130,000.00
Total	\$384,700.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The Australian National University

Project Summary

The SkyMapper telescope will commence a digital imaging survey of the entire southern hemisphere sky in the second quarter of 2014. This project aims to exploit the SkyMapper survey data to discover and characterise the oldest and most metal-poor stars in our Galaxy, constraining both the origin of the chemical elements and the star formation processes that occurred during the initial stages of our Galaxy's formation. At the same time the project will use SkyMapper and other imaging data to increase understanding of the formation of the Galactic halo and of our nearest galaxy neighbours, the Magellanic Clouds.

DP150104250 Djordjevic, A/Prof Michael A; Cook, Prof Douglas R; Udvardi, Dr Michael K; Geurts, Dr Rene

2015	\$158,000.00
2016	\$143,900.00
2017	\$150,000.00
Total	\$451,900.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The Australian National University

Project Summary

Two pivotal goals of agronomic research are to extend the benefits of symbiotic nitrogen fixation resulting from legume interactions with rhizobia, and to improve root architecture so that plants more effectively acquire nutrients and water. This project aims to discover new regulators that are central players in both processes. Applying these regulators to roots should enable legumes to nodulate more, to fix more nitrogen, and to fundamentally alter important aspects of root architecture. Thus, these regulators will be used to enhance nitrogen fixation more widely in legumes and to alter their root architecture to enhance growth. These regulators may find wide utility in improving agriculture in developed and developing countries.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104870 DuBois, A/Prof Thomas D

2015	\$52,202.00
2016	\$32,800.00
2017	\$39,976.00
2018	\$30,000.00
Total	\$154,978.00

Primary FoR 2103 HISTORICAL STUDIES

Administering Organisation The Australian National University

Project Summary

Throughout the early twentieth century, Manchuria was known for two things: its strategic importance and its soybeans. At the same time that the region was politically and militarily contested, Manchuria also experienced stellar economic growth, propelled in large part by the soy economy. This project aims to analyse the changing importance of soy as Manchuria transitioned from Japanese to Chinese rule. Each established mechanisms to control the soy economy, direct its proceeds to private wealth and regional development and increase production through development, reorganization or coercion. The Manchurian soy economy was a proving ground for rural policy elsewhere, and demonstrates both its potential and its limitations.

DP150101425 Easton, Prof Christopher J; Radom, Prof Leo

2015	\$170,000.00
2016	\$163,000.00
2017	\$170,000.00
2018	\$170,000.00
2019	\$170,000.00
Total	\$843,000.00

Primary FoR 0305 ORGANIC CHEMISTRY

Administering Organisation The Australian National University

Project Summary

Life depends on free radical reactions of peptides and proteins but, for these compounds to exist, these must be inherently resistant to radicals. This project aims to combine state-of-the-art experiment and theoretical computations to build a detailed picture of peptide and protein radical reactivity, in order to explain this paradox and resolve ambiguities regarding processes through which radical damage to peptides occurs and is repaired. The project also aims to critically evaluate the basic concept of the fidelity of amino acid incorporation during protein biosynthesis. The results of this project could underpin the development of new strategies and therapeutics to treat human diseases, and new materials and synthetic methods to increase the utility of peptides in biotechnology.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104329 Federrath, Dr Christoph; Klessen, Prof Dr Ralf S

2015	\$105,000.00
2016	\$100,700.00
2017	\$105,000.00
Total	\$310,700.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The Australian National University

Project Summary

This project aims to answer three questions surrounding the birth of stars: What determines the mass of stars when they are born in our Galaxy, the so-called Initial Mass Function (IMF)? How does the IMF depend on the physical properties of the gas cloud in which stars form? By what amount do outflows and jets reduce the mean stellar mass and determine the shape of the IMF? It is expected that the project will generate the most realistic computer simulations of the formation of star clusters to date, with relevance to galaxy formation and evolution. The simulations may also provide the initial conditions for understanding exo-planet formation.

DP150101129 Frankcombe, Dr Terry J

2015	\$110,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$325,500.00

Primary FoR 0307 THEORETICAL AND COMPUTATIONAL CHEMISTRY

Administering Organisation The Australian National University

Project Summary

Quantum mechanical simulation is the most accurate tool available for predicting and understanding chemical reactions. Traditional techniques for performing quantum mechanical simulations of molecular collisions and reactions cannot be applied to more than five or six atoms, meaning that it is not possible to study most chemical reactions in full detail. In this project a new technique for performing these accurate simulations, recently invented at the Australian National University and allowing the study of much larger systems, will be developed and applied to important outstanding problems in chemical dynamics, ranging from roaming in formaldehyde to atom migration in proteins.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104129 Freeman, Prof Kenneth C; Gerhard, A/Prof Ortwin E; Arnaboldi, Dr Magda

2015	\$146,000.00
2016	\$140,000.00
2017	\$125,000.00
Total	\$411,000.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The Australian National University

Project Summary

Spiral galaxies are immersed in vast halos of dark matter which make up more than 90% of their mass. The densities of the dark halos reflect the density of the expanding universe at the time when the halos condensed. The gravitational field of spirals and the density of the halos are measured from their rotation curves. For this analysis, the mass of their visible disks must be known, but it has not been possible to measure disk masses reliably until now. This project aims to exploit new instruments and improved analysis techniques to measure disk masses and halo densities accurately for the first time, and then to answer a central question of cosmology: when did galaxies of different masses form from the ancient expanding universe?

DP150100878 Gibbons, Dr Philip; Cary, Dr Geoffrey J; Gill, Dr Arthur M; Dovers, Prof Stephen R; Moritz, Dr Max A

2015	\$100,000.00
2016	\$57,500.00
2017	\$60,000.00
Total	\$217,500.00

Primary FoR 1205 URBAN AND REGIONAL PLANNING

Administering Organisation The Australian National University

Project Summary

The number of houses destroyed by bushfires in Australia is increasing. This project aims to undertake the first comprehensive analysis of links between land management practices and house loss during bushfires across Australia. Results from this research are expected to improve the ability of authorities, industry and individual home owners to quantify risk from bushfires, and to identify ways that Australian landscapes can be managed to reduce house losses during bushfires. Results from this research will be communicated directly to key stakeholders including government agencies, industry and home owners.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104248 Gray, Dr Edith E; Evans, Dr Heather A

2015	\$48,974.00
2016	\$47,000.00
2017	\$48,974.00
Total	\$144,948.00

Primary FoR 1603 DEMOGRAPHY

Administering Organisation The Australian National University

Project Summary

The timing and context of Australians' entry into parenthood differs across the socio-economic spectrum. This project investigates the socio-economic disparities in entering parenthood, particularly focusing on education and employment differentials as well as socio-demographic factors such as ethnic and religious background, and experience of family dissolution. Using longitudinal panel data, this project aims to: determine the socio-economic and demographic differentials of inequality in first family formation in Australia; discover how inequality in first family formation has changed since the middle of the 20th Century; and, assess how family-policy regime mediates or exacerbates this inequality.

DP150102471 Hall, Dr Ian

2015	\$44,688.00
2016	\$43,100.00
2017	\$30,144.00
Total	\$117,932.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The Australian National University

Project Summary

Understanding the ideas, as well as the interests, underpinning the foreign policy of a rising India is a priority for Australia. This project aims to provide the first comprehensive analysis of Indian conceptions of India's "world role" as they have evolved since Jawaharlal Nehru's death in 1964. It is intended to analyse the development of traditions of thought about India's world role and the work of major Indian thinkers on international relations. It aims to make an original contribution to the understanding of the intellectual underpinnings of Indian foreign policy. The project aims to build research capacity in the study of Indian international thought, leading to publications, as well as public and policy engagement.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102419 Hassell, Prof Andrew

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The Australian National University

Project Summary

Spectral theory is the branch of mathematics dealing with natural frequencies (eigenvalues) and modes of vibration (eigenfunctions) of systems arising in geometry, quantum physics and engineering. As such, they have important applications in seismic and medical imaging, nanotechnology, and optical communications. This project aims to use recently developed mathematical tools to advance our understanding of high energy eigenvalues and eigenfunctions, as well as new algorithms for numerically computing them.

DP150104458 Hung, Dr Hsiao-chun; Carson, Dr Michael T

2015	\$97,235.00
2016	\$93,700.00
2017	\$97,725.00
Total	\$288,660.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The Australian National University

Project Summary

Over several centuries since 4000 BC, the social-ecological setting of Taiwan transformed from low-impact hunting-foraging to high-density village residence and intensive farming. Meanwhile, it was reshaped by new strategic relations with the outside world through migration and trade networks. New research aims to investigate how these long-term developments inter-related and transcended changing climate, natural habitats, population size, and other factors. The research is designed to address how a complex economic landscape system developed and sustained itself through ongoing challenges, by concentrating on Taiwan as a uniquely informative example of combined intensive internal land-use and external partnerships.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104590 Hutter, Prof Marcus

2015	\$85,000.00
2016	\$81,500.00
2017	\$85,000.00
2018	\$85,000.00
2019	\$85,000.00
Total	\$421,500.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The Australian National University

Project Summary

This project aims to drive forward the development of rigorous foundations for intelligent agents. The agent framework, the expected utility principle, sequential decision theory, and the information-theoretic foundations of inductive reasoning and machine learning have already brought significant order into the previously heterogeneous scattered field of artificial intelligence. This project aims to investigate an information-theoretic approach towards a unifying foundation for intelligent agents, which has recently spawned impressive applications. The theory is expected to provide a gold standard and valuable guidance for researchers working on smart software.

DP150103204 Irving, Dr David

2015	\$99,925.00
2016	\$79,700.00
2017	\$32,804.00
Total	\$212,429.00

Primary FoR 1904 PERFORMING ARTS AND CREATIVE WRITING

Administering Organisation The Australian National University

Project Summary

In the Indian Ocean Territories of the Cocos (Keeling) Islands and Christmas Island live the oldest established Malay-Muslim communities within the Commonwealth of Australia. This project examines the history and practice of Malay music traditions through a pioneering ethnomusicological study of music and dance, examining these traditions as key factors in preserving and strengthening unique cultural identities. It also considers how Malay music culture was transplanted to these islands from the nineteenth century onwards. Planned research outputs include the first scholarly articles on these topics, public performances and lectures, a conference and a documentary film investigating the social contexts and cultural meaning of Malay music on the islands.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101107 Jagadish, Prof Chennupati

2015	\$238,000.00
2016	\$208,700.00
2017	\$248,000.00
Total	\$694,700.00

Primary FoR 0912 MATERIALS ENGINEERING

Administering Organisation The Australian National University

Project Summary

This project proposes a new class of nanowire solar cells that do not rely on conventional electrical (p-n) junction for photo-generated charge carrier separation. Instead the band structure of the semiconductors is engineered to form a misalignment which leads to the spatial separation of carriers. This approach is expected to fundamentally change the design of solar cells, eliminating the technologically challenging need for forming good electrical junctions, while retaining all advantages inherent to III-V semiconductor nanowire solar cells. More importantly, the device concept proposed is expected to have implications for a wider class of solar cells based on exotic/novel materials or nanostructures where achieving both n- and p-doping may be challenging.

DP150103373 Jagadish, Prof Chennupati

2015	\$160,000.00
2016	\$153,400.00
2017	\$160,000.00
2018	\$160,000.00
2019	\$160,000.00
Total	\$793,400.00

Primary FoR 0205 OPTICAL PHYSICS

Administering Organisation The Australian National University

Project Summary

Group III-nitride semiconductor devices, which are currently in widespread use in white, blue and green LEDs, and Bluray lasers, have a multi-billion dollar market. This project aims to address and improve the issues and challenges which still limit the true potential of these materials, by tailoring them at the nanoscale. Understanding the fundamental growth mechanisms of these nanowires and their structural, optical and electrical properties will allow precise and controllable synthesis of the nanowires to specific requirements. This will further allow demonstration of high efficiency UV LEDs, compact green/yellow lasers, nanowire solar cells and photoelectrodes for hydrogen generation from splitting water.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104449 Jenkins, Dr Fiona K; Keane, Dr Helen; Sawer, Em/Prof Marian; Donovan, Dr Claire A

2015	\$157,470.00
2016	\$127,500.00
2017	\$112,544.00
Total	\$397,514.00

Primary FoR 1699 OTHER STUDIES IN HUMAN SOCIETY

Administering Organisation The Australian National University

Project Summary

Gender equity has still not been realised, despite decades of activism, policy and research. In some of the social sciences, women make up less than 15 per cent of the professoriate. Yet these are the disciplines that should most aid our understanding of how gender works in society. The project asks what impact women's limited influence and status in these key fields of research has upon our capacity to grapple with the social and political changes necessary for progress toward gender equality. In doing so, it builds persuasive arguments about how and why gender matters in the social sciences. By examining how we judge excellence in social science research, the project aims to contribute to advancing women in all fields.

DP150100862 Jerjen, A/Prof Helmut; Da Costa, Prof Gary S; Norris, Prof John E

2015	\$135,000.00
2016	\$129,500.00
2017	\$135,000.00
Total	\$399,500.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Administering Organisation The Australian National University

Project Summary

This project proposes a multi-wavelength study of optically elusive, dark matter dominated satellite galaxies around the Milky Way. These ultra-faint stellar systems, the first to be discovered in the Southern Hemisphere are the building blocks of our Milky Way and are prime laboratories to assess the stellar and dark matter properties of the most extreme galaxies known. The results are expected to provide crucial insights into the nature of dark matter and the cosmic formation of chemical elements, thereby strengthening Australia's research capacity in one of the most exciting frontiers of astrophysics research.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102345 Jin, Dr Qinian; Hegland, Prof Markus

2015	\$65,000.00
2016	\$95,900.00
2017	\$65,000.00
Total	\$225,900.00

Primary FoR 0102 APPLIED MATHEMATICS

Administering Organisation The Australian National University

Project Summary

This project aims to develop and investigate new computational procedures for the solution of inverse problems which do not have the usual smoothness properties (or source conditions) required for the traditional regularisation methods. Examples of such inverse problems are very common and include image restoration, photo-acoustic tomography and spectroscopy. It is anticipated that this project will substantially extend the toolbox of methods for such problems utilising ideas from Banach spaces, convex analysis, parallel computing and optimisation. This project is expected to make a substantial contribution to a better understanding of inverse problems and their solution procedures.

DP150101011 Kennedy, Prof Rodney A; Durrani, Dr Salman; McEwen, Dr Jason

2015	\$150,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$424,300.00

Primary FoR 0906 ELECTRICAL AND ELECTRONIC ENGINEERING

Administering Organisation The Australian National University

Project Summary

Spherical information underpins many natural phenomena, ranging from the distribution of galaxies in the Universe to the connectivity and neuronal activation in the human brain. Current major investments in scientific and medical instrumentation do not efficiently collect and process the massive amounts of data because they do not properly utilise its inherent spherical geometry. Through harnessing spherical geometry, this project aims to address the above shortcomings and to provide advances across all these application domains. By collecting and processing data more efficiently, with greater fidelity, and by revealing features currently hidden, the methods developed are expected to see the full benefit from the instrumentation capturing this data.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102403 Keogh, Prof J. Scott

2015	\$125,000.00
2016	\$118,000.00
2017	\$112,000.00
Total	\$355,000.00

Primary FoR 0603 EVOLUTIONARY BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to build on previous research on the phylogenetics of Australian vertebrate animals to apply sophisticated new methodological and analytical tools for modelling species diversification. Australia is famous for the great diversity and uniqueness of its plants and animals, due in part to 40 million years of relative isolation. The project plans to test the influence of historical climate and habitat shifts on morphological evolution and assembly of the Australian biota. This project could showcase Australia as the best place in the World to rigorously test hypotheses concerning rates of biological diversification at a continental scale.

DP150104604 King, Dr Penelope L

2015	\$95,000.00
2016	\$57,500.00
2017	\$75,000.00
2018	\$60,000.00
Total	\$287,500.00

Primary FoR 0403 GEOLOGY

Administering Organisation The Australian National University

Project Summary

High temperature gases circulate through Earth's interior and atmosphere, but little is known about how they react. Recent work shows that exceptionally rapid reactions occur between gases and solids at surfaces. These reactions are instrumental in forming ore deposits and transporting gases and salts to Earth's surface, atmosphere and oceans - affecting climate and biological productivity. This project aims to examine natural samples and investigate gas-solid reactions experimentally to constrain reaction mechanisms. It is expected that the project outcomes will open up a new field of geochemistry with novel experiments, state-of-the-art analysis and the development of innovative models that account for the role of gas-solid reactions in Earth and planetary processes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102883 Kirk, Prof Kiaran; van Dooren, Dr Giel G; Broer, Prof Stefan; Cockburn, A/Prof Ian A

2015	\$143,000.00
2016	\$141,000.00
2017	\$141,000.00
2018	\$135,000.00
Total	\$560,000.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The Australian National University

Project Summary

Apicomplexan parasites are single celled organisms that are the causative agents of major diseases in livestock and humans. However, the basic biochemistry of these intracellular parasites is poorly understood, and there are limited treatments available for the diseases these parasites cause. The project hypothesis is that a novel family of proteins that are unique to apicomplexan parasites play a key role in the uptake of essential nutrients (amino acids) into these organisms. This project aims to use a combination of genetic, biochemical and physiological methods to understand the function of these proteins, the role(s) that they play in apicomplexan biology, and their importance for parasite survival.

DP150102070 Kivshar, Prof Yuri S; Shadrivov, Dr Ilya; Khanikaev, Asst Prof Alexander; Zayats, Prof Anatoly V; Zhang, Prof Xiang

2015	\$165,000.00
2016	\$158,200.00
2017	\$150,000.00
Total	\$473,200.00

Primary FoR 0203 CLASSICAL PHYSICS

Administering Organisation The Australian National University

Project Summary

Topological properties play a fundamental role in many physical phenomena. The best known examples are quantum Hall systems, where insensitivity to local properties manifests itself as conductance through edge states that is insensitive to disorder. While the traditional research focus has been on electronic systems, there has been a recent emergence of great interest in exploring topological orders with photons. Several novel intriguing theoretical schemes have been proposed to explore topological orders in photonic systems, both in the linear and strongly interacting regimes. This project aims to develop innovative theoretical and experimental approaches to explore topologically non-trivial states, from microwaves to optical regimes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102071 Kivshar, Prof Yuri S; Brener, Dr Igal; Shvets, Prof Gennady; Lukiyanchuk, Prof Boris

2015	\$160,000.00
2016	\$153,400.00
2017	\$179,000.00
2018	\$160,000.00
2019	\$167,000.00
Total	\$819,400.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to develop a novel research program underpinning the rapid development of a new generation of low-loss nanophotonics based on the physics of optically resonant dielectric nanoparticles. Such nanoparticles are the best candidates for the emerging field of metadevices with unique functionalities well beyond the capabilities of currently existing devices. The project aims to explore the confluence of subwavelength photonics, metamaterial concepts, graphene physics, and nonlinear optics. The expected outcomes of this research will enable the design and world-first experimental demonstration of ultra-thin, tunable, and low-loss metadevices for novel optical technologies with unique energy harvesting, switching, and sensing functionalities.

DP150101035 Lam, Prof Ping Koy; Buchler, Dr Benjamin C; Savage, Prof Craig M

2015	\$160,000.00
2016	\$153,400.00
2017	\$160,000.00
Total	\$473,400.00

Primary FoR 0206 QUANTUM PHYSICS

Administering Organisation The Australian National University

Project Summary

When light collides with matter, it may exert a force called radiation pressure. This project aims to use radiation pressure to levitate a small mirror. Using a tripod of laser beams, it is possible to levitate and trap the mirror in a stable position. Radiation pressure has been used before to levitate, but previous work has always involved scattering light from the levitating object. This project proposes the use of a high quality mirror, allowing the collection of the reflected light and the accurate measurement and control of the position of the mirror as it floats on the laser beams. Using the unique properties of the floating mirror, it will be possible to search for signatures of quantum gravity and develop tools for ultra-precision metrology.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104548 Lambeck, Prof Kurt

2015	\$90,000.00
2016	\$86,300.00
2017	\$90,000.00
Total	\$266,300.00

Primary FoR 0406 PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE

Administering Organisation The Australian National University

Project Summary

Glacio-isostatic (GI) effects are recorded in geological and geodetic data sets and mask other deformational processes. This project builds on past work using geological data with a focus on combining geodetic and geological evidence to improve knowledge of the past ice sheets, separate out effects of past and present deglaciation and develop improved models for the mantle rheology to include time-dependencies in mantle response (transient creep in the first instance). The project aims to provide a complete and predictive description of the GI effects on geodetic data, consistent with geological evidence, such that other tectonic, hydrologic and sea-level signals can be estimated free of these effects.

DP150102632 Magrath, Prof Robert D; Radford, Dr Andrew; Fernandez-Juricic, Dr Esteban

2015	\$171,000.00
2016	\$150,600.00
2017	\$148,000.00
Total	\$469,600.00

Primary FoR 0602 ECOLOGY

Administering Organisation The Australian National University

Project Summary

Information reduces life's uncertainties, and so underlies adaptive decisions in a changing world. However, the importance of information gained from other species is largely overlooked, despite the flow of information, just like resources, affecting individual fitness and population viability. This project aims to use a novel integration of visual and acoustic ecology to test how animals gain reliable information about predators by eavesdropping on the alarm calls of other species. Thus, the project focuses on alarm calls because information about danger is critical to animal survival. The outcomes of the project could help us to understand how natural information webs form and function, and so refine predictions about the impact of environmental change on animal communities.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104464 Maley, Dr Maria

2015	\$30,926.00
2016	\$41,400.00
2017	\$50,746.00
Total	\$123,072.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The Australian National University

Project Summary

The current ministerial and parliamentary staff system in Australia, established by the Member of Parliament Staff Act 1984, created a mechanism by which public servants can disengage from the public service while working as ministerial and parliamentary staffers, and later re-engage with the public service. This project will explore the phenomenon of the so-called 'political public servant' and the nature of impartiality and partisanship, asking whether these attributes are easily adopted and discarded or whether in fact they coexist within a subset of 'hybrid' public servants.

DP150102002 Mathesius, Dr Ulrike

2015	\$142,000.00
2016	\$131,400.00
2017	\$144,000.00
Total	\$417,400.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to use and develop new chemical and microscopy-based tools to test whether the cell-type specific plant hormone changes induced by rhizobia in legumes can be triggered in non-legumes. Most crop plants rely on fossil fuel-derived nitrogen fertilisers, while legumes benefit from biologically-fixed nitrogen through a symbiosis with rhizobia bacteria that initiate nodules. It is not understood why non-legumes cannot form this symbiosis. This project aims to apply detailed knowledge of nodulation in model legumes to a phylogenetically diverse range of nodulating and non-nodulating plant species. This is expected to give new insight into the evolution of nodulation and advance the long held goal of extending nodulation to non-legumes.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103821 McKibbin, Prof Warwick J; Lee, Prof Jong-Wha

2015	\$138,000.00
2016	\$119,900.00
2017	\$140,000.00
Total	\$397,900.00

Primary FoR 1403 ECONOMETRICS

Administering Organisation The Australian National University

Project Summary

This research aims to model the economic implications of Korean re-unification and explore the spill-overs to key economies in the region, including Australia. The approach is understood to be first to develop a model for the existing North Korean economy in collaboration with South Korean researchers at Korea University. This model is intended to be embedded in an existing global economic model. The project aims to then explore scenarios of integration between North and South Korea focusing on changing production structure, development in human capital formation, technology transfer, immigration flows within a unified Korea and the impact on trade and financial flows that may result from different scenarios of how unification will proceed.

DP150100684 McKone, Prof Elinor

2015	\$123,000.00
2016	\$105,500.00
2017	\$115,000.00
2018	\$85,000.00
2019	\$90,000.00
Total	\$518,500.00

Primary FoR 1701 PSYCHOLOGY

Administering Organisation The Australian National University

Project Summary

Low-resolution face images occur in several settings that require a human observer to identify the face or its expression. For example, a crime eyewitness may have seen the perpetrator's face blurred by distance. This project aims to improve low-resolution face perception. Previous approaches have attempted only to improve general image visibility. Here, the novel theoretical idea is to alter the face's structure, tapping knowledge about higher-level face coding. Manipulations are caricaturing and whole-then-part alternation, as derived from face-space and holistic processing theories, respectively. Effects of viewpoint and own-versus-other race faces are expected to test practical generalisability of the new methods, and thus refine theory.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104277 Mietzner, Dr Marcus

2015	\$72,233.00
2016	\$48,200.00
2017	\$50,335.00
Total	\$170,768.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation The Australian National University

Project Summary

This project will study the development of the Indonesian presidency after the fall of long-time autocrat Suharto in 1998. While much of the recent research on this subject has focused on the personalities of the four post-1998 presidents, this project intends to highlight institutional and structural aspects of the presidency. In particular, the proposed research aims to explore to what extent democratisation, decentralisation and power diffusion have constrained Indonesian presidents in exercising executive authority. When completed, the project aims to deliver a comprehensive picture of Indonesia's post-authoritarian presidency, describing in detail its constitutional powers, institutional set-up and structural limitations.

DP150102313 Neeman, Prof Amnon

2015	\$155,000.00
2016	\$148,600.00
2017	\$155,000.00
2018	\$155,000.00
2019	\$155,000.00
Total	\$768,600.00

Primary FoR 0101 PURE MATHEMATICS

Administering Organisation The Australian National University

Project Summary

This project aims to work on major open problems in algebra, towards the solution of conjectures that have been around for decades. The proposed research is ground-breaking, introducing new methods to problems that have stumped experts around the world. The planned techniques the project will use come from homological algebra, more specifically, from derived categories. Preliminary work, using the new methods, has already led to major advances on what was previously known. The project is ambitious: if really successful, it is hoped to reshape the subject and deepen our understanding of the field, but even more modest achievements are expected to clarify and improve on work by international experts over four decades.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103733 Neshev, A/Prof Dragomir N; Decker, Dr Manuel; Rockstuhl, Prof Dr Carsten; Noginov, Prof Mikhail A

2015	\$170,000.00
2016	\$119,900.00
2017	\$125,000.00
Total	\$414,900.00

Primary FoR 1007 NANOTECHNOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to develop a new class of functional light sources by harnessing the nanoscale interactions between emitters and metallic or dielectric nanoparticles. Understanding of these interactions would lead to efficient energy extraction from emitters to far-field radiation; in addition, new functionalities including highly directional emission, circularly polarised emission, and super-radiance would be realised. The outcomes of this project are expected to enable unprecedented control of light emission beyond current capabilities and will revolutionise lighting and display technologies. Furthermore the project aims to open new opportunities for the development of bright bio-medical fluorescent markers as well as deterministic sources of quantum light.

DP150104358 Ollis, Prof David L; Schenk, A/Prof Gerhard; Guddat, A/Prof Luke W; McGeary, A/Prof Ross P

2015	\$145,000.00
2016	\$139,100.00
2017	\$145,000.00
Total	\$429,100.00

Primary FoR 0302 INORGANIC CHEMISTRY

Administering Organisation The Australian National University

Project Summary

The project aims to use an integrated, multi-disciplinary approach to study the properties of a group of related but functionally diverse enzymes; binuclear metallohydrolases (BMHs). These enzymes are of great relevance to protein engineers aiming to produce potent agents for bioremediation and pharmacologists interested in developing drugs. Elucidating and modulating the mode of action of BMHs is thus our main objective and should provide essential information to fully exploit the potential of these enzymes for practical applications. In particular, understanding how metal ions interact with BMHs and how this contributes to their reactivity is crucial to optimally understand their biotechnological potential.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101164 O'Reilly, Dr Dougald J; Shewan, Dr Louise G; Armstrong, Dr Richard A; Lim, A/Prof Samsung; Chang, Dr Nigel J; Domett, Dr Kathryn M; Halcrow, Dr Sian E

2015	\$120,000.00
2016	\$115,100.00
2017	\$95,000.00
2018	\$55,000.00
2019	\$40,000.00
Total	\$425,100.00

Primary FoR 2101 ARCHAEOLOGY

Administering Organisation The Australian National University

Project Summary

Since their discovery in the 1930s, the mysterious collections of giant stone jars scattered throughout central Laos have remained one of the great prehistoric puzzles of south-east (SE) Asia. It is thought that the jars represent the mortuary remains of an extensive and powerful Iron Age culture. This project seeks to determine the true nature of these sites, which date to a dynamic period of increasing complexity in SE Asia (c.500BCE-500CE). The project entails extensive reconnaissance, precision mapping, archaeological excavation and analysis of associated burial material. Using a suite of cutting-edge archaeological technologies, it is expected to have far-reaching benefits for archaeology, science, Laos and World Heritage.

DP150100383 Otting, Prof Gottfried; Graham, Dr Bim; Huber, Prof Thomas

2015	\$170,000.00
2016	\$153,400.00
2017	\$160,000.00
Total	\$483,400.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to develop a new set of tools to structurally characterise protein-protein and protein-ligand interactions that are difficult or impossible to analyse by other means, facilitate tracking of proteins in biological material and identify interaction partners. The project seeks to focus on the synthesis of new unnatural amino acids and tags for site-specific protein labelling, and a range of techniques for 3D structure analysis in solution, in particular NMR spectroscopy. New algorithms are expected to be developed for optimizing NMR spectroscopy and structure calculations from sparse data. The integrated set of tools is expected to deliver better and faster structure analysis and target characterisation to accelerate early stages of drug discovery.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102762 Peakall, Prof Rod; Pichersky, Prof Eran; Linde, A/Prof Celeste; Weston, Dr Peter H

2015	\$157,000.00
2016	\$144,800.00
2017	\$153,000.00
2018	\$100,000.00
2019	\$90,000.00
Total	\$644,800.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to discover new enzymes and genes, unlocking new tools for producing useful chemicals. Many plants secure pollination by attracting animal pollinators. How these crucial interactions evolved remains a mystery. Australia is a world centre for pollination by sexual deception in which hundreds of orchids use novel semiochemicals to sexually attract specific pollinators. In this study we aim to: characterise the biosynthetic pathway and molecular basis of these unique semiochemicals; investigate speciation processes with robust orchid phylogenies; and reveal new insights into the evolution of animal pollination. This should also lead to better design options for managing endangered orchids and developing resilient populations.

DP150104645 Porikli, Prof Fatih; Li, Dr Yi; Harandi, Dr Mehrtash T

2015	\$120,000.00
2016	\$115,100.00
2017	\$135,000.00
Total	\$370,100.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The Australian National University

Project Summary

The objective of this innovative project is to provide a solution to the open question of representing natural images by semantically rich vector graphics. The challenges are to identify key visual and temporal elements for images and videos, and efficiently decompose the visual data into semantic vector representations that are faithful to original data, compact and editable. The project aims to investigate new bitmap-to-vector conversion methods. It is expected to develop a framework where semantic labels and hyperlinks can be embedded in visual data automatically. It hopes to pioneer the creation of a web of images where the links are on image/video regions. New image simplification, stylisation, and non-photorealistic rendering methods are expected to be provided.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150103611 Powell, Dr David A; Neshev, A/Prof Dragomir N; Lapine, Dr Mikhail; Alu, A/Prof Andrea

2015	\$160,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$434,300.00

Primary FoR 0203 CLASSICAL PHYSICS

Administering Organisation The Australian National University

Project Summary

This project will investigate the interaction between electromagnetic waves and mechanical motion in structured media. Enhancing this interaction will improve a number of modern technologies, such as nano-scaled motors, traps for biological samples and optical wrenches. Modern fabrication techniques will link the electromagnetic and mechanical properties of media, so that the electromagnetic forces will greatly increase, making such devices able to manipulate larger objects. Structured materials can also change their properties dynamically, enabling material properties to be altered in real time. This mechanism will form the basis of advanced tunable components to control waves at visible, infrared, terahertz and microwave wavelengths.

DP150101695 Rathjen, A/Prof John P

2015	\$140,000.00
2016	\$134,300.00
2017	\$145,000.00
Total	\$419,300.00

Primary FoR 0607 PLANT BIOLOGY

Administering Organisation The Australian National University

Project Summary

This project aims to clone a new extracellular pathogen receptor, and map immune signalling pathways downstream of both intra- and extra-cellular receptors using innovative biochemical methods. The plant immune system protects plants and crops from attack by pests and pathogens. It is an innate system based on extracellular and intracellular pathogen receptors. Despite the importance of plant immunity in both biological and agricultural terms, little is known about the identity of such receptors or the signalling events that link pathogen perception to response. The results are expected to enhance crop productivity and provide important insights into the architecture of the plant immune system.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104405 Raymer, Prof James; Wilson, Dr Tom G

2015	\$71,411.00
2016	\$63,900.00
2017	\$104,847.00
Total	\$240,158.00

Primary FoR 1603 DEMOGRAPHY

Administering Organisation The Australian National University

Project Summary

The long-term demographic consequences of migration to, from and within Australia, and the dynamic pathways that produced them, will be studied. This will involve the identification of the specific contributions made by international and internal migration to the age and sex population compositions of nine birthplace-specific populations from 1981 to 2011. To do this, publically available data will be collected and augmented with statistical methods to provide a complete, consistent account of population change for around 60 subnational areas. As migration and population change underpins many aspects of societal change in Australia, this research aims to provide an invaluable resource to other scientists and policy makers.

DP150100545 Restubog, Prof Simon Lloyd D; Kiazad, Dr Kohyar; Aquino, Prof Karl; Zagenczyk, A/Prof Thomas J; Scott, Dr Kristin L

2015	\$51,000.00
2016	\$64,300.00
2017	\$30,000.00
Total	\$145,300.00

Primary FoR 1503 BUSINESS AND MANAGEMENT

Administering Organisation The Australian National University

Project Summary

Abusive supervision is costly in Australian organisations. Little is known about the experiences of third parties who are not direct targets of abuse. Indeed, a large percentage of supervisor abuse that is witnessed goes unreported. Using a multi-method approach, this project develops and tests a model that explains third party responses to supervisor abuse. In addition to advancing theory, an evidence-based intervention (including an action tool kit) is developed to empower third parties to combat supervisor abuse by engaging in constructive action. Overall, research outcomes will aim to provide actionable insights into what organisations can do to encourage their employees to take a proactive stance against abusive supervision.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150100356 Robins, Dr Nicholas P; Savage, Prof Craig M; Close, Prof John D; Schreck, Prof Dr Florian; Pfau, Prof Dr Tilman; Weiss, Prof David S; Ketterle, Prof Wolfgang

2015	\$200,000.00
2016	\$105,500.00
2017	\$110,000.00
Total	\$415,500.00

Primary FoR 0999 OTHER ENGINEERING

Administering Organisation The Australian National University

Project Summary

This project aims to create an unprecedented ultra-cold atom source - a high brightness continuous atom laser. Such a device, the atomic analogue of an optical laser, may find near term application in precision inertial sensing based on atom interferometry. The proposed apparatus will utilise new techniques in cutting edge laser cooling and continuous all-optical wave-guiding to dramatically boost the density, collision rate and flux in a guided system. It is expected that the project will allow the study of previously unexplored territory in ultra-cold atom atomic physics.

DP150103468 Shats, Prof Michael; Punzmann, Dr Horst; Falkovich, Prof Gregory

2015	\$145,000.00
2016	\$129,500.00
2017	\$145,000.00
Total	\$419,500.00

Primary FoR 0915 INTERDISCIPLINARY ENGINEERING

Administering Organisation The Australian National University

Project Summary

Strong interest in the motion of active swimmers in turbulent flows is triggered by problems such as sea search and rescue algorithms or diffusion of microorganisms in aquatic environments. For example, the patchiness in the distribution of phytoplankton can be related to the exposure of the microorganisms to turbulent flows. Recent progress in laboratory modelling of turbulence and the fabrication of artificial swimmers using Janus particles makes it possible to study these processes in the laboratory. This project is intended to undertake the first such study. The project is expected to help understand the impact of particle motility on turbulent dispersion.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101889 Smithson, Prof Michael J; Budescu, Prof David V

2015	\$81,000.00
2016	\$77,700.00
2017	\$81,000.00
Total	\$239,700.00

Primary FoR 1702 COGNITIVE SCIENCES

Administering Organisation The Australian National University

Project Summary

Little is known about how people make decisions when faced with uncertainties arising from information that is both ambiguous and conflicting, despite the fact that ambiguity and conflict frequently arise in real decision-making situations. In fact, virtually nothing is known about the joint impact of conflict and ambiguity on judgements of risk and uncertainty or on decisional preferences. This project will investigate how perceptions of uncertainty are jointly affected by conflict and ambiguity in information, develop and test formal models of judgement and decision making under conflict and ambiguity, and examine the joint effects of ambiguity and conflict aversion on decision making.

DP150101939 Tricoli, Dr Antonio; White, Dr Thomas P; Tsuzuki, A/Prof Takuya; Shafiei, Dr Mahnaz; Ippolito, Dr Samuel J; Włodarski, Prof Wojtek; Di Falco, Dr Andrea

2015	\$160,000.00
2016	\$134,300.00
2017	\$140,000.00
Total	\$434,300.00

Primary FoR 0205 OPTICAL PHYSICS

Administering Organisation The Australian National University

Project Summary

This project will investigate the use plasmonic absorption of light in metal nanostructures to activate the selective oxidation/reduction of a gas molecule on a semiconductor nanoparticle. This concept will be used with the aim of developing a sensing technique capable of measuring ultra-low concentrations (ppb) of breath markers for lung cancer detection. It is expected that porous sensing films of semiconductor and metal nanoparticles with well-defined light absorption properties will be fabricated. Superior selectivity will be achieved by matching the wavelength of the absorbed light with the required activation energy for oxidation/reduction. Successful outcomes will enable multi-analyte fingerprint identification by on-chip devices with applications ranging from portable medical diagnostics to national security.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150104595 Williamson, Prof Robert C

2015	\$80,000.00
2016	\$76,700.00
2017	\$90,000.00
2018	\$90,000.00
2019	\$90,000.00
Total	\$426,700.00

Primary FoR 0801 ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING

Administering Organisation The Australian National University

Project Summary

Machine learning is the science of making sense of data. It does not and cannot remove all risk and uncertainty. This project proposes to study the foundations of how machine learning uses, represents and communicates risk and uncertainty. It aims to do so by finding new theoretical connections between diverse notions that have arisen in allied disciplines. These include risk, uncertainty, scoring rules and loss functions, divergences, statistics and different ways of aggregating information. By building a more complete theoretical map it is expected that new machine learning methods will be developed, but more importantly that machine learning will be able to be better integrated into larger socio-technical systems.

DP150103085 Wong-Leung, Dr Yin-Yin J; Joyce, Dr Hannah J

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 0204 CONDENSED MATTER PHYSICS

Administering Organisation The Australian National University

Project Summary

Semiconductor nanowires have enormous potential for large scale industry manufacturing as each individual nanowire represents one device. The aim of this project is the catalyst-free growth of ternary nanowires with control over structure, composition and homogeneity within the wire. Detailed electron microscopy analyses are essential to reconstruct a three-dimensional view of the nanowires and understand the growth mechanism at work. These structural characteristics determine the optical properties. It is expected that precise control over growth will allow the emission wavelength of the nanowires to be tuned and allow their use in optoelectronic device structures. Two innovative techniques are proposed using strain and patterned substrates for ternary nanowire growth.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150102699 Zeil, Prof Jochen; Stuerzl, Dr Wolfgang

2015	\$151,000.00
2016	\$111,200.00
2017	\$124,000.00
Total	\$386,200.00

Primary FoR 0608 ZOOLOGY

Administering Organisation The Australian National University

Project Summary

The aim of the project is to investigate how insects acquire and use scene memories for homing, a crucially important task for most animals. In bees and wasps, these memories are acquired during learning flights when leaving the nest. This fast, active learning process underpins much of the insects' navigational competence, but it remains unknown how it is controlled and how in detail memories guide returns to the nest. It is intended to use the latest camera-based reconstruction tools for the first time: to quantify the navigational information content of habitats including the visual information available to learning and homing insects, and to dynamically modify the insects' natural visual environment in order to critically test hypotheses about acquisition and use of views for homing.

DP150103905 Zhou, Dr Xiangyun; Abhayapala, Prof Thushara D; Yang, Dr Nan; Swindlehurst, Prof Arnold L

2015	\$115,000.00
2016	\$110,300.00
2017	\$115,000.00
Total	\$340,300.00

Primary FoR 1005 COMMUNICATIONS TECHNOLOGIES

Administering Organisation The Australian National University

Project Summary

Wireless communication is vulnerable to eavesdropping attacks since the transmitted signal enters an open wireless medium allowing anyone to overhear it. This project tackles the challenging problem of secure wireless transmissions through the advancement of a new security technology termed physical layer security. Theoretical frameworks are expected to be developed to understand how this new technology extracts the intrinsic security from the wireless medium to protect the confidentiality of information transmission. The research outcome is expected to provide for innovative solutions to safeguard Australia's future commercial, government and military wireless networks, and to give pivotal insights into the impact of this new technology on national security.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

University of Canberra

DP150103615 Dryzek, Prof John S; Ercan, Dr Selen A; Fawcett, A/Prof Paul; Hendriks, Dr Carolyn M; Jensen, Dr Michael

2015 \$148,000.00

2016 \$170,700.00

2017 \$51,000.00

Total \$369,700.00

Primary FoR 1606 POLITICAL SCIENCE

Administering Organisation University of Canberra

Project Summary

The ever-increasing volume of political communication (especially online) challenges democracy and effective policy making. The aim of this project is to examine whether, how, why, and to what effect discourse flows within and between different sites in the new politics of communicative plenty. This research applies the idea of deliberative democracy, which puts meaningful communication between citizens and policy makers at the heart of effective governance. It develops a deliberative analysis of controversy surrounding coal seam gas in Australia, using qualitative and 'big data' techniques to collect information. The knowledge generated is expected to inform efforts to put deliberative democracy into practice, as well as more effective environmental governance.

DP150101839 Duncan, Prof Richard P; Catford, Dr Jane A

2015 \$140,000.00

2016 \$118,000.00

2017 \$135,000.00

2018 \$110,000.00

Total \$503,000.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Administering Organisation University of Canberra

Project Summary

Invasive plants are one of the most costly and significant environmental threats in Australia. To deal with this threat we need to understand how and why certain plant species are able to invade into and dominate native communities. The aim of this project is to uncover the rules that govern this environmental threat. The project endeavours to use theory to predict the outcomes that would be observed given different underlying rules, and then test these predictions with field experiments. By uncovering the rules that govern invasions, this project could provide fundamental knowledge to assist in managing the environmental threat posed by new and emerging weeds.

Summary of Successful Discovery Projects Proposals for Funding Commencing in 2015 by State and Organisation

DP150101961 Lowrie, Prof Thomas J; Hegarty, Prof Mary; Logan, Asst Prof Tracy M

2015	\$72,329.00
2016	\$78,800.00
2017	\$132,390.00
2018	\$114,965.00
2019	\$30,000.00
Total	\$428,484.00

Primary FoR 1302 CURRICULUM AND PEDAGOGY

Administering Organisation University of Canberra

Project Summary

Increasingly, mathematics competence will be measured in digital and dynamic contexts. Students who possess high visuospatial reasoning are expected to become even better equipped to succeed in science, technology, engineering and mathematics (STEM) related disciplines as technological advances shape how we interpret and decode information. This project explores those aspects of visuospatial reasoning critical for success when students encounter dynamic mathematics tasks, and attempts to determine whether different forms of visuospatial reasoning are required to decode static and dynamic information. The project aims to better understand how students process mathematics tasks, so the inevitable move toward digital assessment can be managed effectively to promote assessment for learning.

DP150100608 Unmack, Dr Peter J; Adams, Mr Mark A

2015	\$131,000.00
2016	\$103,600.00
2017	\$110,000.00
Total	\$344,600.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Administering Organisation University of Canberra

Project Summary

Carp gudgeons are the most abundant, widespread and biodiverse freshwater fishes in southeastern Australia. The unacknowledged presence of many cryptic species and sexually-parasitic lineages severely taints all research on this cornerstone group. This project aims to provide unrivalled evolutionary, genomic, and taxonomic insights into this new instance of vertebrate sexual parasitism, which offers a unique mix of research advantages not displayed by any other sexual/unisexual complex. The knowledge gained could impact many research fields, including evolutionary theory addressing the unexplainable prevalence of sex, native fish ecology, and environmental monitoring of the Murray-Darling Basin, an ecosystem of world significance.