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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)		Total ($)	Partner Organisation(s)
(Columns 1 and 2)	(Column 3)	2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	(Column 9)	(Column 10)
Australian Capital Territory								
The Australian National University								
LP190100010 Elliman, Prof Robert G	Contact resistivity and parasitic resistance have been identified as limiting factors in the performance of next-generation semiconductor devices. This project aims to understand these limitations and to develop methods to mitigate them through the application of advanced ion implantation processing. Specifically, this will involve: investigating the effect of selective doping on electrical properties of metal-semiconductor interfaces; determining how ultra-shallow dopant profiles are affected by device structure and processing; and developing improved methods for measuring ultra-low contact resistivity. The research will be undertaken as a collaboration between researchers at the Australian National University and Applied Materials Ltd. **National Interest Test Statement** This project addresses a technological challenge that has been identified as a major limitation to the performance of the next generation of semiconductor devices, namely the increasing significance of contact resistance in small scale devices. The proposed research is at the forefront of its field and is based on a collaboration between the Australian National University and Varian/Applied Materials. As such it provides important training and employment opportunity for young Australian scientists and engineers. The links with Varian/Applied Materials also provide access to state-of-the-art ion-implantation technology and insight into industry trends. This insight benefits the broader Australian research community by informing developments at the NCRIS-funded Australian Facility for Advanced ion implantation Research (AFAiiR), a user facility that supports a diverse range of Australian research.	81,050.00	149,000.00	77,390.00	0.00	0.00	307,440.00	APPLIED MATERIALS
LP190100621 Close, Prof John D	This project aims to investigate the basic science underpinning a new rotation sensing technology based on matterwave vortices. Current gyroscopes are susceptible to long-term calibration drifts, which limit their applicability on long timescales where re-calibration is not practical or possible. This project expects to build a matterwave vortex gyroscope and demonstrate that it offers unparalleled long-term stability over `classical' gyroscopes based on mechanical and/or optical technology. This could deliver new navigation capabilities, benefitting Australia's defence forces and nascent space technology industry, as well as enabling slow timescale precision gravimetry for mineral exploration, hydrology, and geology. **National Interest Test Statement** This project offers a unique opportunity to combine world-class university researchers and facilities with a major international partner and an Australian start-up company to advance Australia's nascent quantum technology industry. The technology that this project aims to develop exploits the innate stability of quantum systems to make a major advance in rotation sensing, enabling important new capabilities that benefit end-users of inertial navigation and Australia's mining industry. This project is at the forefront of research and development in quantum sensors and will contribute to Australia's ability to remain a world leader in quantum technologies. Many of this project's outcomes will enhance quantum inertial sensors more broadly, directly impacting the mapping of underground mineral resources and groundwater resources. This project will take place in a university department that has a strong record of translating fundamental science to industry applications. The new knowledge generated will therefore help establish Australia as a world leader in the commercialisation of quantum technologies.	183,000.00	180,000.00	195,000.00	0.00	0.00	558,000.00	NORTHROP GRUMMAN, NOMAD ATOMICS PTY LTD
LP190100888 Charles, Prof Dr Christine	The project aims to increase the yield of molecular negative ion sources by improving our understanding of the formation of ion beams from plasma sources and expand our knowledge of molecular negative ion generation in plasma environments leading to brighter ion beams. For example, understanding cancer requires cellular level tools to map how cells are changing. These maps are made using ion beams which are scanned across cells to remove material that is analysed at the atomic and molecular level. Ion beams are produced from plasma sources, but much of their operation is not understood. Such improved ion beams are expected to enable inexpensive and fast cellular level pathology at even small hospitals to tackle cancer for society's benefit.	150,000.00	100,000.00	100,000.00	0.00	0.00	350,000.00	OREGON PHYSICS

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	National Interest Test Statement The primary social benefit of understanding ion production is in their use in the emerging field of cellular-level pathology. The more intense the ion beam is, the faster and cheaper a single scan can be performed. This could have a profound impact in the fight against cancer by increasing the speed and decreasing the cost of advanced pathology. The primary economic benefit from fast and cheap cellular-level pathology is in the early detection of cancers when current and proven cancer treatments can be used. Thus reducing the financial impact of cancer to our aging community. Additionally, the increase in cellular-level pathology data may will likely provide insights we currently have not conceived. The secondary economic benefit of improved ion sources is in their use in advanced manufacturing. Fabrication of advanced microstructures requires bright ion sources for focused ion beam (FIB) milling. In particular, intense negative ion beams are used in the fabrication of advanced optics.							
LP190101060 Costanza, Prof Robert	This project aims to improve farm resilience, farm management, and economic decision-making in Australia and internationally. It expects to generate new interdisciplinary knowledge to integrate our understanding of agro-ecosystems and innovative tools to assess their status and manage their operations more effectively. Expected outcomes include the ability to inform farmers, bankers, and land managers about the trade-offs between resilience and efficiency on farms. This should provide significant benefits, including the ability to minimize financial risks to farmers and banks, allow better investment decisions, and achieve sustainable long-term outcomes for both private and public well-being.	119,713.00	113,147.00	90,231.00	0.00	0.00	323,091.00	NATIONAL AUSTRALIA BANK LIMITED, DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT
	National Interest Test Statement Agriculture represents approximately 1/3 of the Australian economy. It is increasingly vulnerable to extreme weather patterns (for example fire, drought, floods, and other environmental hazards) and, as such, risk and resilience are crucial factors in the management in its management. This project will significantly advance integrated understanding and management of agro-ecosystems. It will allow farmers, bankers, and land managers to better assess the value of natural, social, human, and built capital assets on farms and make better investment decisions. This will improve resilience, long-term economic prosperity, and well-being, for farmers, bankers, and society as a whole.							
	The Australian National University	533,763.00	542,147.00	462,621.00	0.00	0.00	1,538,531.00	
University of Canberra								
LP190101198 Dryzek, Prof John S	The project will enact and film the world's first truly global citizens' deliberation, a global citizens' assembly (GCA) on genome editing, and proceed to analyse the impact of the 'deliberative documentary' film on public understanding of complex, fast-evolving science and technology. It will investigate the cross-cultural capacity of citizens to deliberate complex value-laden issues, and so ascertain prospects for an informed global public response to challenges posed by genome editing. Research will test the effects of the deliberative documentary on viewers, examining benefits of communicating complex issues via the work of the GCA. Other benefits include improving public trust in governance and advancing the Australian film industry.	88,000.00	208,000.00	143,000.00	0.00	0.00	439,000.00	GENEPOOL PRODUCTIONS PTY LTD
	National Interest Test Statement This global project will yield clear benefits to Australia. Both the academic leadership and the partner organization are based in Australia. The project will help cement Australia's place in the forefront of scientific documentary film making, and as a leader in the research and practice of deliberative and democratic innovation. The project will benefit Australian industry by advancing Genepool as a leading documentary film maker, now able to extend its activity to the world's first deliberative documentary, gaining an edge in standing, status, and capacity in relation to its international competitors. The deliberative documentary can be used as a prototype by Genepool when seeking future business. End-users of the research will also include regulatory agencies in Australia, corporations interested in the commercialization of genome editing technologies, and international organizations such as the World Health Organization and Food and Agriculture Organization of the UN, all of which will get a better picture of informed public thinking on the benefits and risks of genome editing technologies.							
	University of Canberra	88,000.00	208,000.00	143,000.00	0.00	0.00	439,000.00	
	Australian Capital Territory	621,763.00	750,147.00	605,621.00	0.00	0.00	1,977,531.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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New South Wales

Macquarie University

LP190100330 Piper, Em/Prof James A	Current security labelling technologies using pattern coding (“barcoding”) and/or UV-excited phosphorescent inks are relatively easily counterfeited. The project aims to identify optimal design, fabrication and surface treatment of infrared-excited lanthanide nanoparticles for use as pigments in UV-curable polymer inks. This is expected to result in a new-generation of jet-printable security inks with ultimate capability for multidimensional coding (using multiple luminescence wavelengths and lifetimes) and robust readability. Expected outcomes are world leadership in codable inks for secure labelling against counterfeiting, greatly enhancing both global ink-product sales and the value of Australian exports subject to product substitution.	184,848.00	188,435.00	72,500.00	0.00	0.00	445,783.00	MOS TECHNOLOGIES PTY LTD

National Interest Test Statement

The research is expected to make major contributions to the Australian economy both directly through the competitive advantage derived by the Partner Organisation through the development of world-leading security labelling products, and indirectly through enhanced market share of Australian export products vulnerable to product substitution in the international market. In particular, the research will ensure MOS Technologies are able to produce nanoparticle pigments with high reliability and repeatability in commercial production, with a precision which allows security inks to be customised for special applications. The capability to time-code the inks will provide a unique, world-wide advantage in the market for security labelling because of the additional dimension of security afforded by the patented lifetime coding capability. Such advanced security labelling technologies can effectively eliminate counterfeit labelling, with the potential to substantially increase the value of authentic Australian products, for example high-end wine and foods, in our major export markets.

LP190100900 Evans, A/Prof Tanya G	As the first collaborative and multidisciplinary, scholarly and community-based study of a forgotten shale-mining settlement in the environmentally and culturally significant Jamison Valley, this project aims to advance knowledge and enable cross-generational engagement with the history and heritage of an industrial landscape, thereby improving our understanding of the long-term impact of deindustrialisation. By combining archaeological, archival and oral evidence the project aims to provide new insights into everyday working and family life, community, gender, transiency and migration that can contribute to conservation of this site and its industrial heritage, cultural heritage tourism and education at a time of environmental change.	50,000.00	50,000.00	50,000.00	0.00	0.00	150,000.00	BLUE MOUNTAINS WORLD HERITAGE INSTITUTE LIMITED, NPWS, LANTERN HERITAGE PTY LTD, MTS HERITAGE

National Interest Test Statement

2020 provides an unparalleled opportunity to work with our partners National Parks and the Blue Mountains World Heritage Institute (BMWHI) to produce a test case assessing the impact of brutal bushfires on valuable heritage sites, while also providing resources for industrial heritage conservation, education and cultural heritage tourism in the context of immense environmental change for the local community. By producing new knowledge about Jamison Valley shale mining communities and past and current landscapes, this project will benefit scholars, heritage managers, local community members, students, lifelong learners and other end-users. Enhanced knowledge of the area’s material and intangible culture resulting from collaborative research and innovative outcomes, including traditional and multimedia digital resources, will add social and economic value to Australia through contribution to heritage conservation, education and cultural tourism that engages with local, labour, community and family history and attracts new visitors to one of Australia’s most popular tourist destinations in the Blue Mountains.

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LP190100927 Hose, Prof Grant C	This project aims to tackle a critical challenge of groundwater management – to understand and predict the impacts of declining groundwater levels. Over pumping and declining groundwater tables are a global problem, yet the effects on the ecosystems that exist within aquifers are poorly known. This project will create a world first evidence-based model of how lowering water tables affects the microbes, invertebrates (stygofauna) and ecological processes in groundwater ecosystems, and will demonstrate the consequences of such changes to groundwater quality and availability. This model will allow impacts to be reliably forecast and avoided or mitigated, vastly improving how major developments affecting groundwater are planned and implemented.	124,002.00	127,227.00	115,015.00	0.00	0.00	366,244.00	DEPARTMENT OF INDUSTRY
	National Interest Test Statement Over 3500 gigalitres of groundwater is used annually in Australia to meet domestic, irrigation and industry needs, with an estimated direct value of $1.8–7.2 billion per annum. The continued supply of clean groundwater depends on the services provided by microbes and invertebrates (stygofauna) that inhabit aquifers, yet they are threatened by the immense demand and frequent overuse of groundwater. This research will address key areas identified by both industry and government as being fundamental to the ecologically sustainable management of water resources in Australia. In 2018, the Senate Inquiry into Water Use by Extractive (mining) Industries recommended the Commonwealth Government identify current research gaps on the impacts of extractive projects on underground water ecosystems, including the potential impacts on stygofauna and microbial communities. This research directly addresses the recommendations of that inquiry.							
LP190100992 Hart, A/Prof Nathan S	Existing commercial electronic shark deterrents, which attempt to deter sharks by emitting strong electric pulses into the water, are either ineffective, have limited deterrent range, or have only been tested with great white sharks. Moreover, uncertainty regarding the way in which pulsed electric fields deter sharks, and whether they may even attract sharks, hampers the development of improved deterrents. This project aims to investigate the effects of pulsed electric fields on shark physiology and behaviour, develop novel electronic pulse waveforms that maximise the deterrent effect on a range of shark species, and deliver innovative improvements in electronic shark deterrent technology that will save the lives of humans and sharks.	168,620.00	107,797.00	122,738.00	0.00	0.00	399,155.00	LE CENTRE SÉCURITÉ REQUIN (SHARK SECURITY CENTRE), TARONGA CONSERVATION SOCIETY AUSTRALIA, SEA WORLD QLD, OCEANS RESEARCH
	National Interest Test Statement This project will save the lives of water users (especially surfers and paddlers) by increasing the uptake of personal shark deterrents and improving the effectiveness of electronic shark deterrent technology. It will also protect sharks and other marine animals by reducing the need for costly and indiscriminate shark meshing/culling programs, which have a significant environmental impact through bycatch of non-target species and yet have little effect in reducing shark attack risk. The project will create innovative shark deterrent technologies suitable for commercialisation into a global market. It will also help to protect and enhance the significant direct and indirect economic benefits of watersports-related industries to local and regional communities in Australia and around the World.							
	Macquarie University	527,470.00	473,459.00	360,253.00	0.00	0.00	1,361,182.00	
Southern Cross University								
LP190100468 Kretzschmar, A/Prof Tobias	New critical knowledge will enable future breeding of quality black rice cultivars that can exploit the high UV Australian growing environment to enable domestic production of high-value, healthy black rice. The demand for functional foods with health benefits, including black rice, is increasing both domestically and internationally. The concentration of key functional compounds in black rice may be increased by growing optimised cultivars under high-UV radiation, making Australia well placed to produce the highest quality black rice. Utilising a unique genetic resource this project will resolve how the interaction between crop genetics and the growing environment drives the concentration of functional compounds in black rice.	188,667.00	229,567.00	186,607.00	0.00	0.00	604,841.00	NATURAL RICE CO PTY LTD

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	National Interest Test Statement The project will benefit Australia in two ways. Firstly, the project will pave the way for a profitable crop alternative for farmers in the subtropics and northern Australia to improve farm income and increase the financial sustainability of farming businesses in regional and northern Australia. This will arise from the development of high-value black rice lines from tropical rice germplasm as a result of the project knowledge gained. The development of such a high-value industry should also give rise to new processing and packaging facilities in these regions, thus creating jobs along the supply chain for regional Australia. Secondly, the project will provide critical genetic and nutritional information for future breeding of high- value 'healthy' rice to help meet the national targets of improving the health of the Australian population.							
	Southern Cross University	188,667.00	229,567.00	186,607.00	0.00	0.00	604,841.00	
The University of New South Wales								
LP190100176 Clark, Dr Stuart R	This project aims to build a new workflow for improving resource exploration evaluation by Australian companies and applied to three practical industry cases in frontier basins. The expected outcomes of this proposal are: detailed risk analysis of oil and gas prospectivity in frontier basins onshore and offshore Australia; a new strategic collaboration between Australian industry, government and universities; students trained in advanced computational methods suitable for the evolving Australian oil and gas industry; and a software product that has high commericalisation potential. The project will transfer knowledge from European industry and universities to Australia and has applications for mineral prospectivity in sedimentary basins.	144,245.00	147,998.00	148,335.00	0.00	0.00	440,578.00	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION, LUNDIN NORWAY AS, SANTOS LIMITED, GEOSCIENCE AUSTRALIA
	National Interest Test Statement Gas is an important part of Australia's energy security. The chief concerns are meeting domestic demand while continuing to meet increasing demand for export. Exploration for new resources are of vital importance in meeting this growing demand. This project aims to put Australian exploration at the forefront of technology development by utilising advances in computing to optimise and automate the exploration workflow, reducing costs for the industry and improving the mapping of Australia's oil and gas resources. Seismic acquisition and offshore drilling, such as Equinor well in the Great Australian Bight, have featured as major concerns for the Australian public and this project will reduce the need to acquire new data by interpolating between existing data using existing geological information as a guide. As a result of this project, exploration companies operating in Australia will be able to make better decisions based on existing data. By making intelligent use of available data, this project will reduce the environmental footprint of exploration and minimising the need to acquire new data.							
LP190100519 Anstey, Prof Kaarin J	This project aims to enhance our understanding of whether cognitive changes associated with ageing impacts older drivers' use of emerging vehicle automation and assistive technologies. Through analysis of insurance claims databases, a large consumer survey and a naturalistic driving study, evidence will be obtained on how ageing and cognition interact with assistive technology. Findings will inform older drivers, government policy makers and industry on ageing, cognitive changes and the use of assistive technology in vehicles. This will provide benefits for older drivers by promoting optimal driving which will enhance social engagement as well as safety.	213,375.00	185,995.00	282,839.00	0.00	0.00	682,209.00	SUNCORP GROUP LIMITED, NATIONAL SENIORS AUSTRALIA LTD
	National Interest Test Statement This project will enhance our understanding of how older drivers interact with emerging vehicle technologies. Researchers will collaborate with insurance partners to evaluate industry claims data, and collect new data on the use and impact of assistive technologies on safety in older drivers, and partner with consumer and senior advocacy bodies to develop evidence-based consumer resources. Outcomes include knowledge, validated tools and consumer resources, and evidence to inform vehicle design and licensing policy. Project outcomes will foster economic benefits through support of Australian insurance industry, benefit road safety policy and services, and quality of life for Australian seniors.							

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LP190100551 Moss, Prof Jeremy	Australia's climate transition will have to drastically cut our national emissions. Yet our transition also needs to be fair. This project will develop a social justice framework for the implementation of a zero net emissions climate transition for rural Victoria. This will be the first comprehensive incorporation of social justice framework with detailed mitigation strategies for rural Australia. The research will combine insights from leading Australian and international energy groups and current research to produce valuable inputs into a national just transitions strategy and provide benefits to Industry partners and the sector. The project will significantly contribute to our understanding of a just climate transition.	56,269.00	80,762.00	54,343.00	0.00	0.00	191,374.00	HEPBURN WIND, RENEW AUSTRALIA, LITTLE SKETCHES, SAMSO ENERGY ACADEMY, CENTRAL VICTORIAN GREENHOUSE ALLIANCE INCORPORATED
	National Interest Test Statement This project will have far-reaching social benefits for Australians living in communities that are seeking to move to zero net emissions. A good climate transition strategy should reduce emissions, but must also ensure that the benefits and burdens of that transition are fairly shared within society. This 'social justice' dimension is crucial to ensuring that vulnerable individuals and communities are not made worse-off by any transition strategy. This project will deliver a social justice framework for assessing how several rural Victorian communities can satisfy their energy needs and achieve zero emissions in a way that also has social justice benefits. The project will be the first to incorporate robust measures of the social justice benefits of a climate transition in Australia, offering the opportunity to significantly improve Australian's lives and achieve real benefits for the national community.							
LP190100552 Biddle, A/Prof Jennifer L	This project aims to develop a long-term research partnership between Warlpiri Indigenous knowledge holders, anthropologists, and community arts industry partner Tracks Dance Company. It will investigate Milpirri Festival as arts innovation, engaging community-members in collective responsibility for Indigenous heritage and futurity. The project will generate new knowledge of Milpirri song, dance, art and story through practice-based research with benefits for industry partners and Lajamanu community of increased community participation, outreach and impact.	159,786.00	158,528.00	151,313.00	0.00	0.00	469,627.00	TRACKS INC
	National Interest Test Statement This project contributes to the protection of at-risk and intangible Indigenous knowledge through the development of a new digital archive of Aboriginal culture and ceremony presented in the innovative NT festival, Milpirri. Under the guidance of senior Warlpiri knowledge holders, the archive is a landmark Indigenous digital media development project safeguarding and understanding the significance of emergent cultural practices in Milpirri. By addressing the underexplored area of contemporary ritual through fieldwork-based collaborative research, this project contributes to the burgeoning international dialogue at the intersection of sense-based ethnographic research and Indigenist designed digital archives. In turn, positioning Milpirri and Lajamanu Warlpiri community participants as pioneers, reversing the erasure of culture through experimental, contemporary ceremony.							
LP190100563 Del Favero, Prof Dennis G	The Project aims to investigate an interactive spatial aesthetic that facilitates modelling of operatic rehearsal design. It will do this through application of an experimental artistic system that reshapes concepts of spatial design through collaborative interaction between creative teams and digital systems. It demonstrates how creatives can immersively design a rehearsal in real time at up to 1:1 scale, assisted by an evolving database. It transforms our understanding of rehearsal design and the way it can be aesthetically explored, with outcomes that optimise and streamline design processes in the performing arts industry.	180,000.00	188,000.00	194,000.00	0.00	0.00	562,000.00	OPERA AUSTRALIA
	National Interest Test Statement The Project provides a transformation of rehearsal design for opera by providing a networked virtual rehearsal modelling system. It proffers increased economic efficiencies by robustly testing performative, scenographic and technical design components and their spatial interaction prior to fabrication and staging. The end-result is a distributed solution offering a suite of capabilities that facilitate broad industry uptake by enabling companies to model, rehearse and evaluate designs for their venues and for global touring. While enlarging the creative scope of experimentation leading up to the live stage rehearsal, it ensures the integration of departments within a performing arts organisation and builds a culture of interdisciplinary collaboration across its creative and technical teams. While focused on opera, the outcome will also impact the art, design, event, film, and music sectors, as each involve rehearsal processes that can be enhanced through networked digital modelling.							

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LP190100601 Kara, Prof Sami	This project aims to develop an automated disassembly solution for End-of-Life (EOL) Electric Vehicle (EV) batteries, which is flexible and modular to handle the uncertainties associated with model changes, condition of the EOL battery packs as well as the projected volume growth. The outcome of this project will lead to a better separation of EV battery components and materials. This will allow recycling of EOL EV batteries with a higher material recovery efficiency and a lower cost due to the significantly reduced labor cost; hence substantially reduce the environmental footprint associated with EOL treatment of these batteries.	200,000.00	129,980.00	129,127.00	0.00	0.00	459,107.00	GOTTFRIED WILHELM LEIBNIZ UNIVERSITY OF HANNOVER, VEOLIA ENVIRONMENTAL SERVICES (AUSTRALIA) PTY LTD, VEOLIA ASIA
	National Interest Test Statement The proposed project tackles a critical problem; Australia's waste management, which has been further amplified with the recent rejection from countries that used to take Australian waste. Disassembly is a crucial step in waste management since it leads to better material separation. Furthermore, the closing of the battery material value chain is a key part of Australia's critical mineral strategy, as stated in the Department of Industry, Innovation and Science, 2019, Report on "Australia's Critical Minerals Strategy". Electric Vehicle batteries have a vital role in this due to the critical battery materials they contain such as Lithium, Cobalt, and Nickel. Therefore, proper disassembly and recycling of them will bring unquestionable economic and environmental benefits to Australia through developing an enabling technology towards closing the battery material value chain, creating further business for waste management of EV batteries.							
LP190100642 Sorrell, Prof Charles C	Aim: To use conventional manufacturing and advanced manufacturing to produce an unprecedented form of zirconia: Fully stabilised monoclinic zirconia. Significance: The product utilises waste and inexpensive raw materials and it avoids the universal nanoscale transformation from the tetragonal and cubic forms of zirconia, which are commercialised. Outcomes: The product can have widespread uses in the chemical, refractory and mining industries and the technology aims to expand the industrial partner's commodity base from structural ceramics to high-tech ceramics. Benefits: Greater utilisation of waste and Australian raw materials, new commercialisation opportunities, new training and employment opportunities and breakthrough research.	121,400.00	141,600.00	143,100.00	0.00	0.00	406,100.00	VECOR AUSTRALIA PTY LTD
	National Interest Test Statement Economic/Commercial: The project is directly relevant to Australia's biggest industry, which is mining. Australia produces ~50% of world's zirconium and all mining companies use ceramic impact- and wear-resistant materials. Thus, the outcomes will service both primary and secondary mining sectors. Other Australian industries to benefit are biomedical device manufacture (orthopaedic implants and dental restorations) and nonferrous metal production. The biomedical applications are significant since Australia has a thriving sector and the 2019 global market for zirconia bioceramics is estimated to be ~A$3.6 billion. For the nonferrous metals markets, while such primary metal manufacture represents 60-70% of production, just the recycling industry alone, which is a heavy user of refractories in remelting furnaces, had a 2018 global market for such secondary metals of ~A$15.4 trillion. Environmental: The project involves the utilisation of the pervasive stockpiled waste material fly ash. Social: The project will involve the training of a postdoctoral fellow and numerous postgraduate and honours students.							
LP190100650 Rey, Dr David	This project aims to conceive, develop and deploy innovative methodologies for stable on-demand workforce management and fleet logistics based on advanced decision-support systems. The outcome of this project will provide a new cloud-based real-time Optimisation Software-as-a-Service (OSaaS) platform that allows businesses to improve their productivity while reducing operating costs and their environmental footprint. This is expected to support the manufacturing, retail, delivery and mobile fleets industries.	55,218.00	55,218.00	55,218.00	0.00	0.00	165,654.00	STAYBIL PTY LTD
	National Interest Test Statement Workforce and fleet management are fundamental processes of the logistics supply chain which stands at the heart of small, medium and large-scale businesses. According to the Australian Logistics Council (ACL), the logistics industry represents 8.6% of GDP and employs 1.2 million Australians. Further, the ACL estimates that for 1% increase in efficiency in the sector, GDP will be boosted by AUD 2 billion. The proposed project is expected to improve the efficiency of the logistics industry by developing a cloud-based real-time decision-support system to reduce businesses operating costs and environmental footprint.							

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LP190100681 Kudrna, Dr George	This project, in collaboration with the World Bank and the Indonesian Planning Authority, will support major social and economic policy development in a rapidly ageing region. It will break new ground by developing a cutting-edge economic policy model reflecting salient features of ageing in emerging economies, taking into account the wider implications for education, employment, formalisation, growth, and retirement. It will bring the armoury of policy analysis instruments available to these countries up to the standard now enjoyed by the developed world. Indonesia, on the brink of major pension reform, will be used as a test bed. Data sets will be developed to allow the model structure to be applied to other emerging economies in Asia.	81,000.00	100,000.00	80,000.00	0.00	0.00	261,000.00	WORLD BANK, BAPPENAS
	National Interest Test Statement The project will establish Australia's reputation as a leader in the economics of population ageing, and pension economics, in the region. This will be important for Australia's partnerships with its neighbours over coming decades, as demographic change takes hold across much of Southeast Asia. Indonesia is Australia's second largest foreign aid recipient, and a primary focus of that aid is social policy development. This project contributes directly to that goal and supports two of the five pillars of cooperation outlined in the Australia-Indonesia Comprehensive Strategic Partnership agreement: enhancing economic and development partnership and contributing to Indo-Pacific security and prosperity. The project will also provide Indonesia and other Southeast Asian nations with the means of designing well-thought-through policies to ensure social cohesion and poverty are addressed under the stresses of demographic change, large informal sectors, and widespread regional migration. This will help to buttress social stability within these nations, an outcome which is clearly in Australia's national interest.							
LP190100751 Keulemans, Dr Guy	The project will generate new knowledge in design-based repair and reuse of consumer products to develop a new community of craft and design practitioners, audience and clientele, in collaboration with leading Australian design and craft organisations. It responds to the pressing cultural and environmental burden of product obsolescence and consumer waste through innovation in transformative repair – a designed reworking of broken or discarded consumer objects that transforms their aesthetic appeal and cultural value. It applies transition design theory to develop localised progressions of the transformative repair model to foster knowledge exchange between partner organisation while contributing to a sustainable design economy in Australia	148,000.00	124,000.00	129,000.00	0.00	0.00	401,000.00	AUSTRALIAN DESIGN CENTRE, JAMFACTORY CONTEMPORARY CRAFT & DESIGN INCORPORATED, DESIGN TASMANIA LIMITED
	National Interest Test Statement This project has impact and benefit to Australia by testing the capacities of transformative repair to address problems of unsustainable artefact consumption. Its case studies explore and evaluate a transformative repair market for craft and design professionals, enlarging the scope of practice for their supporting organisations. This has significance for diversifying the expertise and services of studio practitioners for the provision of new repair possibilities for consumers in ways that extend product and material lifetimes. The project has wide national benefit, positioning Australia at the forefront of sustainable design, by re-thinking normative practices of consumerism, revitalising and improving the perception of repair culture and contributing to social, cultural and environmental wellbeing through the local repair of globalised products and the reduction of waste and unsustainable consumption.							
LP190100829 Chu, A/Prof Dewei	This project aims to develop next generation printable memory devices with low cost and excellent stability. The goal will be achieved by developing a new class of metal oxide nanomaterials based inks and large scale printing technology, through optimizing the synthesis, printing process and electrode configuration. The expected outcomes will be new electronic materials for a wide range of end uses in flexible electronics, significant advances in energy efficient data storage devices, and commercialisation of the technology to Australian industries.	99,705.00	110,026.00	114,341.00	0.00	0.00	324,072.00	AUSTRALIAN ADVANCED MATERIALS PTY LTD, COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
	National Interest Test Statement The development of new metal oxide based inks for printed electronics represents a significant technological advance. The printed electronics market is estimated to reach US$ 13.35 Billion by 2024 from US$ 6.8 Billion in 2018, at an annual growth rate of 16.71% during 2018-2024. The project is built on long term collaboration between Australian Advanced Materials Pty Ltd (AAM, Perth), which is under the ASX-listed firm Strategic Elements, and UNSW. During the last 4 years, the UNSW research team has licensed a couple of innovative technologies in printed electronics area to AAM. Through on-going collaborations between AAM and UNSW, the technologies developed from this project will facilitate low cost, flexible and large area data storage devices for Internet of Things, Big Data, wearable devices, and medical instruments. The research will revolutionise Australia's advanced manufacturing capabilities, leading to the generation of innovative technologies, patents and potential commercial products in printed memory devices.							

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LP190100990 Mostaghimi, A/Prof Peyman	We aim to develop advanced methods for determination of coal properties required for optimising gas recovery, scheduling future developments and water management by Queensland Gas Company. We will characterise multiphase flow of gas and water in coal cores by Positron Emission Tomography and flooding experiments. Advancement in knowledge is achieved by using massive data from 4D-imaging to predict evolution of petrophysical properties at in situ condition in different types of coal. This will future proof Australia as the world's largest exporter of natural gas and will provide significant benefit for the industry in satisfying domestic gas security, maintaining international commitment and addressing environmental concerns.	122,868.00	115,095.00	72,818.00	0.00	0.00	310,781.00	QGC PTY LIMITED
	National Interest Test Statement This proposal is concerned with developing and testing state-of-the-art engineering methods for Australian natural gas industry. Natural gas is considered as a clean energy as it emits 50 percent less carbon dioxide than coal when combusted. Australia has more than 3 billion cubic metres of gas proven reserves and, as of 2019, natural gas is the second largest Australian resource export by dollar value. The partner organisation is one of the largest worldwide producers of coal seam gas operating 2,600 wellbores in Australia. The proposal addresses significant challenges confronting the industry - natural gas deliverability and environmental impact of produced water. Novel experimental and characterisation methods are developed to reduce uncertainty associated with gas production to enable the energy sector to improve efficiency and prioritise long-term strategies. The intended outcomes enable the industry to reliably predict future performance of their assets, assess potential environmental impacts and reduce operational cost by optimising recovery scenarios.							
LP190101003 Lord, A/Prof Megan L	This project aims to advance knowledge of the biochemical and biophysical structure of the endothelial glycocalyx, a dynamic cell surface extracellular matrix rich in proteoglycans and glycosaminoglycans. It will be the first to explore how charged glycopolymers interact with this dynamic interface with the goal to develop a model of the glycocalyx lifecycle. This project is expected to enable the transfer of skills, knowledge and ideas as well as advanced research and industrial training for young scientists. Knowledge derived from this project is expected to enable future innovation in molecules with tailored interactions with the glycocalyx with significant benefits for researchers, manufacturers and end users.	202,131.00	203,107.00	195,395.00	0.00	0.00	600,633.00	SYNEDGEN, INC.
	National Interest Test Statement This project will explore the biophysical and biochemical mechanisms by which the surface of vascular endothelial cells (known as the glycocalyx) undergoes structural modification that leads to shedding. Disruption of this surface can lead to structural changes and shedding which affects cell function, transport of cells and molecules, as well as the balance between the circulation and tissues, with potentially serious consequences. This project will enable fundamental understanding of this process and allow Australian researchers to continue a collaboration that will enhance our reputation in biomaterials. Whilst a first step, it is envisaged that in the longer term this work will have significant impact in the growing biomaterials industry in Australia.							
LP190101139 Poole-Warren, Prof Laura A	Platinum is the main material used in electrodes for neurostimulators like the cochlear implant. Platinum electrodes can experience dissolution during implantation, which can impact on their function. The mechanisms governing this dissolution process are complex and still not fully understood. This research aims to understand the chemical, electrical and biological factors that impact on platinum dissolution in electrodes. It will also develop new 3D models to simulate conditions in the human body for more rapid testing of electrodes. The new knowledge generated will improve the accuracy of predictions of platinum dissolution, develop new approaches for minimising dissolution, and contribute to reducing need for animal experimentation.	150,740.00	197,395.00	195,235.00	161,014.00	0.00	704,384.00	COCHLEAR LIMITED

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	National Interest Test Statement							
	This research will have significant economic, commercial and social benefits as a direct result of the research and through longer-term impacts. ECONOMIC BENEFITS This project will have a significant impact on the economy through training of specialised researchers with industry-relevant skills, and through accelerating product development processes through application of the 3D tissue-like structures for evaluating new neural devices. COMMERCIAL BENEFITS Through the increased materials/biomedical engineering knowledge generated, the Partner Organisation and emerging neural stimulation companies such as Saluda Medical, Bionic Vision Technologies and Nyxoah, will benefit. Development of robust, new coatings and surface/bulk modification technologies will support development of more advanced neural interfacing technologies, and potentially result in the formation of new companies. SOCIAL BENEFITS The key social benefits encompass the reduced need for animal experimentation in product development, and potential quality of life benefits in the future for people who have neurostimulation devices implanted.							
LP190101169 Primig, A/Prof Sophie	We aim to design a novel manufacturing process for superalloy aero-engine parts with superior mechanical properties. This is significant because optimisation of the hot-forging route of the most commonly used Alloy 718 will enable targeted control of its nanoscale precipitate microstructure leading to substantial increases in the high-temperature strength. The expected scientific outcomes are new physical metallurgy knowledge of the microstructure-property relationships of superalloys. The expected technological and societal outcomes include enhanced aero-engine material performance, creating benefits such as shorter flights over longer distances, and safer, more fuel-efficient air travel.	190,000.00	190,000.00	190,000.00	0.00	0.00	570,000.00	VOESTALPINE BÖHLER AEROSPACE GMBH & CO KG, VOESTALPINE HIGH PERFORMANCE METALS (AUSTRALIA) PTY LTD
	National Interest Test Statement							
	Shorter flights over longer distances are transforming the world's business, society and culture. Safer, more fuel-efficient air travel has positive impacts on the environment, health and human mobility. The Asia-Pacific region will account for >42% of the growth in demand for next generation turbofan aero-engines. A critical enabler for harnessing this growth opportunity is advances in the physical metallurgy of superalloys, since these are the materials that underpin the manufacture of aero-engine components. Beyond aerospace, superalloys are widely used in the chemical processing, and oil & gas industries, all of which are also of crucial strategic importance to the Australian economy. Moreover, there is great interest in the additive manufacturing opportunities for superalloys. This research will generate local metallurgical expertise in superalloys that positions Australian institutions, researchers and businesses at the centre of this growth in a high technology sector of great strategic significance.							
	The University of New South Wales	2,124,737.00	2,127,704.00	2,135,064.00	161,014.00	0.00	6,548,519.00	

The University of Newcastle

LP190100510 MacFarlane, Dr Geoff R	Endocrine disrupting chemicals (EDCs) can produce alarming detrimental impacts on the reproduction and survival of aquatic species, though little is presently known in terms of their effect and impacts on sensitive marine invertebrate species. We propose the development and validation of the first marine mollusc as a biomonitor for the detection and impact assessment of estrogenic contaminants in Australian estuarine and marine waterbodies. Such biomonitors will provide water management agencies with the capability to manage estrogenic effluent discharges and provide the oyster industry with a tool to prevent product contamination, ensuring the continued health and sustainability of our aquatic resources.	50,000.00	50,000.00	50,000.00	0.00	0.00	150,000.00	HUNTER WATER CORPORATION, DEPARTMENT OF PRIMARY INDUSTRIES, PORT STEPHENS OYSTER BRANCH NSW FARMERS ASSOCIATION
	National Interest Test Statement							
	The outcomes of the proposed project will provide water management bodies within Australian waterways validated molluscan biomonitoring tools to make informed decisions and facilitate protection of estuarine/marine communities in response to estrogenic diffuse and point inputs. A validated biomonitor will also protect the oyster industry from potential impacts of anthropogenic contamination, associated public health risks and perceptions influencing product marketability.							

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LP190101283 Melchers, Prof Robert E	This project will improve understanding of the gradual deterioration of ships and maritime structures subject to metal corrosion, fatigue and extreme sea-state conditions. Increasingly such understanding is necessary for optimal asset management decisions. These include the potential economic, personnel and other risks involved for ship owners and operators, including the Royal Australian Navy (RAN). The project will use numerical simulation. It will tackle the Fluid-Structure Interaction problem of ships in waves by integrating Finite Element structural response analysis with cutting-edge Smoothed Particle Hydrodynamics methods. The outcomes will provide new insight into remaining asset life and for exploring optimal maintenance strategies	224,149.00	224,149.00	224,149.00	0.00	0.00	672,447.00	PACIFIC ESI, DEFENCE SCIENCE AND TECHNOLOGY GROUP
	National Interest Test Statement By better predicting the structural response of naval vessels and commercial maritime assets subjected to severe operational and deterioration environments, this project has the potential for significant defence, commercial, economic and environmental benefits for Australia. It will contribute to more optimal management of the structural integrity of defence vessels, and also to the safety, reliability and life-time economics of such vessels, offshore structures, and other maritime assets. This will have benefits to national defence preparedness and to both industrial and government end-users in areas such as improved asset functionality and reduced downtime due to repairs. Indirect benefits include safer structures and lower risks to the environment. These matters are important not just for operational preparedness, as for the Royal Australian Navy, but also for the optimization of the economic and commercial benefits of other, usually, very expensive, maritime assets.							
	The University of Newcastle	274,149.00	274,149.00	274,149.00	0.00	0.00	822,447.00	
The University of Sydney								
LP190100619 Rogers, Dr Dallas	This project aims to show how digital technologies are transforming the private rental sector in Australia. This project expects to generate new knowledge about the growing global reach of digital technologies aimed at private renters, landlords and property managers. The expected outcomes of this project include the production of social scientific knowledge about the potential of digital technologies to be both socially pernicious and socially progressive. This project should provide significant benefits for Australian renters and our tenant advocacy partners who represent them, and to show how digital technologies can be used to create a better housing system.	53,674.00	69,825.00	107,204.00	0.00	0.00	230,703.00	TENANTS' UNION OF NSW CO-OPERATIVE LIMITED, TENANTS QUEENSLAND INC, TENANTS VICTORIA
	National Interest Test Statement The project will lead to significant social benefits. Firstly, the project will identify the potential social costs and benefits of different digital real estate technologies and will produce policy recommendations to address these costs. These policy outputs are intended to inform legislators and policy makers. Secondly, the project will create a digital technology that the Partner Organisations can use in their advocacy for more equitable housing policies and systems. This technology will be open access and freely available. Thirdly, the outcomes of the project will directly inform the partner organisations' future advocacy work in the private rental sector and the sector's use of digital real estate technologies. The project also has potentially significant economic benefits. Private rental housing is a growing housing sector and is a major cost to household budgets, especially for low-income private rental households. The project will show the potential positive and negative impacts of digital real estate technologies on housing costs for those accessing the private rental market.							
LP190100732 Thorp, Prof Susan J	This project expects to develop evidence-based communication tools that promote life-time financial security, specifically investigating the puzzling and harmful tendency of people to under-save while working and under-spend while retired. To achieve this goal, it will design and experimentally validate innovative boosts to superannuation communication including income projections and goal-setting targeted at common misconceptions and biases. It will use new structural modelling techniques to measure welfare changes. The expected outcomes are rigorous explanations for the saving-spending puzzle, and robust communication strategies for superannuation funds that will benefit workers and retirees by raising financial capability and confidence.	128,484.00	131,623.00	132,338.00	0.00	0.00	392,445.00	THE TRUSTEE FOR CONSTRUCTION AND BUILDING UNIONS SUPERANNUATION FUND

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	National Interest Test Statement Australia's retirement income system is failing to provide the incentives for self-provision that are needed to ensure adequacy and sustainability. At the heart of this problem is Australians' inability to make long-term financial plans - manifested in our tendencies to both save too little while we are working and to spend too little once we retire. This project will provide the first clear understandings of the real-world behavioural hurdles and the underlying conceptual impediments to planning for a financially secure retirement. It will give superannuation funds the communication tools they urgently need to raise workers' and retirees' capacity to provide for themselves. This research comes at a critical juncture as governments seek clear strategies in the face of a population that has, for the first time, more people over 65 than under five. There is broad agreement that the time to act is now, ensuring the outcomes of this Project will be immediately useful to government and industry, and ultimately, to individuals who need to actively manage their financial futures.							
LP190100842 Chan, Prof Hak-Kim	This project aims to develop a novel design toolbox that can accurately predict dispersion performance of a range of powder systems for high-dose inhaler devices. The project expects to provide the pharmaceutical industry with a cornerstone technology to facilitate the design and optimisation of new powder delivery devices. Outcomes are expected to include new knowledge on powder dispersion behaviour that can be applied to various industry sectors, including the environmental, bulk chemical and food industries where the majority of products are in powder form. This knowledge will provide significant benefits to industry through provision of a toolkit that can be used to improve final powder-based product quality.	168,119.00	176,709.00	118,769.00	0.00	0.00	463,597.00	SUZHOU SINGMED MEDICAL DEVICE SCIENCE AND TECHNOLOGY LTD
	National Interest Test Statement The proposed technology will enable performance prediction of powder inhalation products that are designed and manufactured in Australia. This will reduce the time and cost of the process and improve the success rate of final products. The proposed research would see Australian universities playing a key role in redefining R&D of powder inhaler devices globally. It will also enable Australia to excel as a leader in the international community of powder formulation and device design. Most importantly, the intellectual property will reside within Australia for commercialisation, thus enabling potential future benefits to end-users and the local industry. This is particularly attractive due to an increasing need to develop inhalation products for delivery of high powder loads of bioactive molecules for novel applications.							
LP190100850 Ringer, Prof Simon P	Our aim is to understand the origins of the properties of tungsten-carbide cobalt based hard metals and how these may be tuned via alloying and processing. This is significant because hard metals are used in industrial-scale turning, milling and drilling processes to cut other materials into finished parts with precise tolerance and surface finish. The expected outcomes are increased competitiveness of Australia's aerospace, agriculture, biomedical, construction, defence, mechatronics, mining, and oil and gas industries, which depend on this materials technology. The benefits will be the creation of leading expertise in advanced manufacturing, support of end-user industries and the establishment of a regional R&D focal point in hard metals.	231,839.00	240,474.00	241,983.00	0.00	0.00	714,296.00	CERATIZIT AUSTRIA GMBH
	National Interest Test Statement This research will establish a major R&D activity in Australia by one of the world's largest producers of hard metals, creating new local expertise in manufacturing. Hard metals are high-value tooling materials that underpin the manufacture of critical precision parts in a range of nationally strategic industry segments (e.g.): aerospace, agriculture, biomedical, construction, mechatronics, mining, oil and gas, post-processing of additively manufactured parts, and a multitude of defence-related technologies. Hard metal-based tools are used in industrial-scale turning, milling and drilling processes to cut other specialised materials into finished parts with precise tolerance and surface finish. This research will guide the design and development of new WC-Co based hard metals, via the creation of microstructure-property-processing relationships. This benefits Australian end-users of this strategic materials technology. There are environmental benefits from improved performance in advanced cutting, drilling and milling operations with prolonged tool life leading to more efficient use of resources.							

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LP190100966 Cooper, Prof Rae C	This project aims to investigate how women and men understand and experience the changing nature of work and their hopes and fears for the future. This project expects to generate new knowledge about the gendered dimensions of workplace change using an innovative and engaged research design that focuses on retail and the law, two areas where women are increasingly dominant, but which are located at distinct ends of the labour market. Expected outcomes of this project include an enhanced and coordinated capacity to build gender equality into the future of work. This should provide significant benefits such as better living standards for individuals and families and improved profitability and productivity for businesses.	162,695.00	122,815.00	184,991.00	0.00	0.00	470,501.00	THE LAW SOCIETY OF NEW SOUTH WALES, WOMEN LAWYERS ASSOCIATION OF NEW SOUTH WALES INC, SHOP DISTRIBUTIVE & ALLIED EMPLOYEES ASSOCIATION
	National Interest Test Statement Designing gender equality into the future of work has clear economic and social benefits for all Australians. Gender equality at work enhances living standards for individuals and families, improves the profitability and productivity of businesses, and is a key driver of economic growth. With rapid changes reshaping the employment landscape, Australia is at a pivotal moment. By investigating how women and men experience and understand the changing nature of work, this project develops insights to enable business and government to design workplaces and workplace policies that enable women and men to thrive equally at work, and ensure that existing inequalities are not replicated and amplified into the future.							
LP190101011 OBrien, Prof Patricia M	This project aims to explore the realities of living with intellectual disability in Australia, and the impact of individualised funding arising from the introduction of the NDIS. The study will examine, within this era of disability reform, how people with intellectual disability are having their needs met, and the extent to which they are involved in decision-making about their lives. The study will be conducted over three years using a mixed method design. It will specifically examine the relationship between self-directed individualised funding and its effect on personal well-being, self-esteem and voice, choice and control. People with intellectual disability will act as co-researchers within the study.	76,642.00	58,612.00	59,332.00	0.00	0.00	194,586.00	UNITINGCARE NSW ACT, UNITINGCARE VICTORIA AND TASMANIA, THE HOUSING CONNECTION LIMITED, ACHIEVE AUSTRALIA LIMITED, NEW HORIZONS ENTERPRISES LIMITED, THE UNITING CHURCH IN AUSTRALIA SYNOD OF VICTORIA AND TASMANIA
	National Interest Test Statement This study will explore the efficacy of the role that the NDIS is playing within Australian society. The scheme is premised on providing voice, choice, and control to people with disability, while funding individualised packages budgeted to meet their selected goals. The major point of enquiry of this work is to see if people with intellectual disability believe that their needs are being meet, thereby impacting on their lifestyles, well-being, and self-esteem. The NDIS is of interest to Australian citizens as it is paid for through an overhead tax, and so there is a high level of national interest concerning the value of their tax dollars in enhancing the lives of people with intellectual disability.							
	The University of Sydney	821,453.00	800,058.00	844,617.00	0.00	0.00	2,466,128.00	
University of Wollongong								
LP190100603 Du, Prof Haiping	An electric vehicle powertrain mainly consists of an electric motor-driven system, a mechanical transmission and other components. This project aims to explore innovative powertrains with a regenerative braking function to maximise driving range, reduce power consumption, and enhance the dynamic performance of electrified vehicles. The proposed powertrains are expected to achieve seamless gear changing for driving and better braking performance by applying magnetorheological technology for a high-quality control of power-shifting, and therefore significantly improve vehicle dynamic and economic performance. A new era of high-efficiency electric powertrains could potentially be launched through the development of these novel technologies.	134,638.00	105,340.00	97,600.00	0.00	0.00	337,578.00	XIAMEN GOLDEN DRAGON AUTOMOBILE ELECTRONIC CO LTD, M&S ENGINEERING PTY LIMITED

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	National Interest Test Statement This project aims to provide new technologies to develop powertrains with a focus on dynamic and economic performance for electrified commercial vehicles. This project is expected to have direct impacts on electrified transport in automotive industries by delivering national economic and social benefits via environmentally sustainable transport, which reduces energy consumption and pollution. Furthermore, the automotive original equipment manufacturers (OEMs) in Australia will benefit from increased productivity.							
LP190100984 Susilo, Prof Willy	Blockchain is a promising technology in the digital world today. However, existing approaches for enabling blockchain applications, particularly with privacy protection and anonymity, are vulnerable to quantum computer attacks. This project aims to enable novel cryptographic mechanisms together with their cryptographic libraries for protecting blockchain in the quantum world, hence, post-quantum secure blockchain. The expected outcomes of this project include innovative technologies, as well as secure and practical post-quantum protocols for protecting future blockchain applications. This will provide economic and social benefits to Australian industry through the enablement of advanced technologies which are developed in Australia.	60,639.00	69,609.00	69,609.00	0.00	0.00	199,857.00	KDDI RESEARCH INC., TIDE FOUNDATION
	National Interest Test Statement There has been an increase in Australian blockchain activities since 2010. Australia is also home to many leading blockchain initiatives, including industry-specific trials for solutions in energy, agriculture, and the public sector. According to the Minister of Industry, Science and Technology, Karen Andrews, Australia's blockchain sector is expanding rapidly, and the development of a national blockchain roadmap announced recently will help Australia seize these opportunities. However, in both Australia and worldwide, all deployed blockchain applications are vulnerable to quantum computer attacks. This project will advance Australia's National Interest by placing Australia at the forefront of efforts to prepare next-generation blockchain for applications in the upcoming quantum computer era. The technologies developed in this project will benefit Australian cybersecurity research since they will enable anonymity and privacy protection of users in many online activities, which is an important Australian National Cybersecurity priority.							
LP190101183 Spangaro , Prof Jo M	We will adapt and test an evidence-based intervention to identify and address domestic violence with newly arrived refugee women, partnering with Settlement Services International, one of Australia's largest providers of settlement programs. Domestic violence is the lead contributor to premature death among Australian women, and costs $22 b each year, with refugee women at heightened risk. This study will compare outcomes for women who receive the intervention to controls and culturally sensitive, scaleable tested tools. This intervention should reduce the human and financial cost of domestic violence among refugee and other vulnerable migrant women, providing tools to settlement services to address this complex, hidden problem.	163,028.00	147,486.00	131,850.00	0.00	0.00	442,364.00	SETTLEMENT SERVICES INTERNATIONAL LIMITED, SETTLEMENT COUNCIL OF AUSTRALIA INC, DOMESTIC VIOLENCE NSW INC
	National Interest Test Statement Domestic violence is a serious social and public health issue. Violence against women and their children costs Australia $22 billion a year, with Australian Governments expending 19% of this. Refugee women are at greater risk of domestic violence, but do not use mainstream services for support. Australia's resettlement program supports refugees on arrival, and these services have untapped potential to intervene early with refugee women experiencing abuse through tools which this study will deliver. Both the National Settlement Services Outcome Standards and National Plan to Reduce Violence Against Women and Their Children 2010-2020, stress the importance of the wellbeing, social and health outcomes of refugee women and their children. This project will address three of six priorities in the Plan including: i) improve identification and of and early response to domestic violence; ii) address access to support for women from culturally and linguistically diverse backgrounds; and iii) implement evidence-based programs for domestic violence and measure their outcomes for women.							
	University of Wollongong	358,305.00	322,435.00	299,059.00	0.00	0.00	979,799.00	

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Western Sydney University								
LP190100262 Crabtree, Dr Louise	Australia has a persistent shortage of affordable, quality housing. Housing cooperatives are member-based organisations providing rental and owner-occupied homes to members. They are associated with benefits for member-residents, including improved housing, improved senses of belonging and community, and employment and education outcomes. However, evidence for those benefits has gaps, so this study aims to develop a framework for assessing housing cooperative benefits and to develop a typology to identify the factors shaping those benefits. The project outcome will be an evidence base of what works in cooperative housing, which can benefit the country by providing a rationale for growth of and policy support for socially beneficial housing.	77,894.00	84,284.00	0.00	0.00	0.00	162,178.00	AUSTRALIAN COOPERATIVE HOUSING ALLIANCE
	National Interest Test Statement Housing in Australia continues to be unaffordable for many people. As a result, growing numbers of Australians are trying to make a long-term home in a rental system that is geared towards short-term tenancies, or are becoming homeless. Further, as our population ages, we face increasing risks of homelessness and isolation among older people. Currently, Australians have a basic choice between increasingly expensive homeownership or insecure renting. Housing cooperatives can offer an additional, stable, and affordable housing option. In other countries, housing cooperatives have been associated with a range of benefits for their residents due to their focus on community involvement - including better quality housing, greater social networks, improved senses of belonging, and improved employment and education outcomes. Australia has a very small housing cooperative sector and this project will work with the sector peak bodies to demonstrate the values it creates. This will provide justification for expanding the sector as a way to provide more affordable, accessible, and socially beneficial housing.							
	Western Sydney University	77,894.00	84,284.00	0.00	0.00	0.00	162,178.00	
	New South Wales	4,372,675.00	4,311,656.00	4,099,749.00	161,014.00	0.00	12,945,094.00	

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Northern Territory								
Charles Darwin University								
LP190100367 Judd, Prof Barry A	This project aims to investigate the changing face of cultural tourism in central Australia and examine pathways towards sustainable aboriginal employment in and around Uluru-Kata Tjuta National Park. The project is significant because it brings together Aboriginal community members, industry and government stakeholders to identify micro-business opportunities, youth training initiatives, better relations across cultural divides, and the economic value of Aboriginal knowledge. Outcomes include a model for sustainable Aboriginal employment in remote and very remote contexts, and the development of culturally relevant and sustainable governing guidelines for regional investment. Benefits include more sustainable jobs for Aboriginal people.	257,565.00	224,316.00	217,280.00	0.00	0.00	699,161.00	MUTITJULU COMMUNITY ABORIGINAL CORPORATION, VOYAGES INDIGENOUS TOURISM AUSTRALIA PTY LTD, TOURISM NT, PARKS AUSTRALIA
	National Interest Test Statement This project is in Australia's commercial, environmental, social and cultural national interest through providing a mutually beneficial best practice model. This project proposes a model for sustainable Aboriginal employment in remote and very remote contexts. Unemployment rates for Aboriginal people living in these contexts remains unacceptably high and seemingly entrenched. Addressing Aboriginal unemployment in remote areas remains a wicked problem that continues to vex Australian governments, NGOs and Aboriginal community organisations who seek to increase Aboriginal employment rates through sustainable employment in the real economy. Until the issue of remote Aboriginal unemployment is successfully addressed, the social, economic and well-being issues that negatively impact remote Aboriginal communities including poverty, suicide, family violence and child neglect will not be ameliorated. This project develops models of sustainable employment for Aboriginal people in remote areas in empowering ways removing the need for Australian government income support and welfare interventions.							
	Charles Darwin University	257,565.00	224,316.00	217,280.00	0.00	0.00	699,161.00	
	Northern Territory	257,565.00	224,316.00	217,280.00	0.00	0.00	699,161.00	

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Queensland								
Griffith University								
LP190100398 McGregor, Dr Glenda V	This project aims to address a critical gap in knowledge about the experiences and conditions of people who teach in flexible and non-traditional schools in Australia. These schools provide a second chance at education for young people with challenging behaviours and/or learning problems. This project expects to generate new knowledge about the experiences and needs of these teachers, using a combination of in-depth research methods. Expected outcomes include detailed understanding of support needs for this workforce. This will significantly benefit teachers, sponsors and principals through recommendations on best practice management of this important work, along with evidence-based training artefacts for staff recruitment and retention.	51,818.00	50,846.00	51,396.00	0.00	0.00	154,060.00	EDMUND RICE EDUCATION AUSTRALIA - FLEXIBLE LEARNING CENTRE NETWORK, COMMUNITY LEARNING LTD, YOUTHINC
	National Interest Test Statement The workforce in flexible/non-traditional schools in Australia provides a vital service to the nation by educating young people who have left school early, without a sense of belonging to communities and lacking the skills necessary to gain meaningful work. This project will provide evidence on the nature of the teaching workforce in flexible/non-traditional schools, their pedagogical, curricular and relational practices and the support structures they require. It is in the national interest to keep all young people in education rather than losing them and risking permanent disengagement from society. Low levels of education are associated with ill-health, crime and a lack of civic participation. This research will provide evidence and support structures to assist principals and teachers who are at the heart of re-engaging marginalised young people to reconnect to education, work and community. Thus, the findings will contribute to development of a body of knowledge and practical approaches to ensure educational quality and value for money in the short term, with social and economic dividends in the future.							
LP190101083 Trevathan, Dr Jarrod A	This project will develop an intelligent remote water quality monitoring platform based on a new sensor network architectural paradigm. Expected outcomes include an artificially intelligent water quality monitoring system that is produced via a unique social enterprise business model. This approach will facilitate widespread remote water quality monitoring, leading to an enhanced understanding of the environment, whilst providing valuable training/education for the community stakeholders involved in the production of the system. The research outcome will be globally significant, enabling end users to meet key water quality objectives over time, and considerably increase productivity in the Australian agriculture/aquaculture industries.	130,000.00	130,000.00	130,000.00	0.00	0.00	390,000.00	SUBSTATION 33
	National Interest Test Statement This project will develop a socially conscious intelligent IoT platform for water quality monitoring to address a major technical and cost barrier for widespread water asset management. Through the use of a social enterprise business model and e-waste components, the system can be produced in a cost-effective and environmentally-friendly manner whilst providing significant social and educational benefits for disadvantaged members of society. We propose a novel software-based architecture that uses artificial intelligence methods to enable smart insights into the data and remote dynamic updates to the system configuration. The project will train a team of five new water quality technology and management experts, adding to Australia's globally recognised pool of research talent. The success of this project has the potential to revolutionise the approach to remotely monitor water bodies, provide an enhanced understanding of environmental processes that contribute to healthy waterways, lift industrial productivity, and give the Australian agriculture and aquaculture industries a large international advantage.							

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LP190101141 Burford, Prof Michele A	This project will apply innovative approaches to develop a functional equivalency of nutrients from catchment versus point sources. This is fundamental knowledge needed for the successful application of nutrient offsetting. This market-based mechanism involves point source polluters choosing to pay for catchment restoration, which is offset against their nutrient discharge. Currently, despite its potential, there is a lack of confidence in the scientific robustness of nutrient offsetting. The proposed new indicators in nutrient equivalency would provide the foundation needed to ensure that governments and industry can have the confidence to engage in nutrient trading schemes, ultimately ensuring environmental and social benefits.	207,107.00	217,507.00	215,507.00	0.00	0.00	640,121.00	DEPARTMENT OF ENVIRONMENT AND SCIENCE, HEALTHY LAND AND WATER LTD, SYDNEY WATER CORPORATION, CENTRAL SEQ DISTRIBUTOR-RETAILER AUTHORITY
	National Interest Test Statement This project aims to establish an evidenced-based nutrient equivalency index that can be used to compare pollutant effects from different nutrient sources, thus providing greater certainty for a fair, robust nutrient offset trading system. After being tested in Queensland and New South Wales, this approach would be applicable throughout Australia, and would also be highly relevant internationally. The nutrient offsetting approach can be a win-win for point source polluters, e.g. sewage treatment plant operators, and the environment by allowing sewage discharge from a growing population in cities and towns, in exchange for restoration of degraded catchments to reduce nutrient losses from the land. Additionally, there will be benefits for rural communities with opportunities for catchment restoration works. The approach will be more broadly applicable to a range of industry and polluters, including the aquaculture industry and urban stormwater pollution.							
LP190101218 Sampford, Prof Charles J	This project aims to investigate the role of professions in rebuilding trust in residential building construction in Australia. In the wake of expensive and life-threatening building defects, this project expects to generate new knowledge about the functioning of individual professionals, professionals employed in multi-profession organisations, and professionals' interaction with their institutional environment. Expected outcomes include practical recommendations for improved professional standards, a rigorous building integrity system and a means for measuring change. Anticipated benefits include greater awareness by professions, trades and regulators of their role in in delivering the public goods of a trustworthy construction industry.	146,296.00	205,782.00	188,672.00	0.00	0.00	540,750.00	PROFESSIONAL STANDARDS COUNCIL, DEPARTMENT OF MINES, INDUSTRY REGULATION AND SAFETY, DEPARTMENT OF HOUSING & PUBLIC WORKS, CORRS CHAMBERS WESTGARTH
	National Interest Test Statement The lack of confidence and trust in the building industry and in building products is jeopardising one of Australia's most critical industries. This research project directly confronts this challenge, by advancing theoretically sound and feasible means for professions to contribute to rebuilding trust in the construction industry. Improved professional standards, a more rigorous building integrity system, and the means by which to measure impacts of change will assist professions, trades and regulators, individually and collectively, in delivering the public good of reliable buildings. The outcomes will help the Australian industry create buildings that are well designed, constructed, and maintained as well as appreciated by their occupants. This will benefit local employment, investment and business opportunities, as well as bringing the social and cultural benefits associated with consumer and community confidence.							
LP190101251 Lu, Prof Junwei	The project aims to develop and commercialise an Advanced Microgrid Energy-Management System (AM-EMS) to enhance the energy efficiency of residential, commercial and industry buildings. It will allow the industry partner to integrate their existing products in AM-EMS with maximum returns. The intended outcome of the project is an AM-EMS with optimised energy scheduling and distribution, incorporating renewable energy sources and battery storage systems. End-users will benefit from reduced energy costs, improved energy efficiency and reliability, with the added benefit of new and innovative clean energy technology. The research community will benefit from new knowledge that will underpin international improvements in energy efficiency.	149,932.00	149,932.00	149,932.00	0.00	0.00	449,796.00	PLANET ARK POWER

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	National Interest Test Statement This project falls under this research priority by directly addressing one of the goals, namely 'Australian electricity grids that can readily integrate and more efficiently transmit energy from all sources including low- and zero-carbon sources. The $50 million program announced recently by the Australian Government will fund feasibility studies looking at Microgrid technologies to replace, upgrade or supplement existing electricity supply arrangements in off-grid and fringe-of grid communities located in regional and remote areas. Microgrids are stand-alone power systems that can operate independently or maintain a connection to the grid by harnessing distributed energy resources such as solar PV, wind power and batteries. It will provide an opportunity for the Australian business to lead in emerging advanced microgrid technology which will bring national economic, commercial and environmental benefits. It will also attract international researchers and industry partners to further develop the product for other countries.							
	Griffith University	685,153.00	754,067.00	735,507.00	0.00	0.00	2,174,727.00	
James Cook University								
LP190100484 Cernusak, Dr Lucas A	This project aims to investigate the impact of within species adaptation to climate on restoratoin success in the Australian Wet Tropics. For a suite of six species of tropical tree frequently employed in rainforest restoration plantings in northeast Queensland, this project aims to test the hypothesis that collecting seed from populations in similar ecoclimatic settings to the planting site will result in superior seedling growth and survival. The expected outcome is to provide practical advice to restoration practitioners about the importance of matching the provenance of seed source to planting sites, and opportunities for selecting provenances pre-adapted to predicted future climatic conditions at planting sites.	150,074.00	171,203.00	88,960.00	0.00	0.00	410,237.00	AGRF DIAGNOSTICS, THE ROYAL BOTANIC GARDEN SYDNEY, GREENING AUSTRALIA LTD, RAINFOREST RESCUE, BIOME 5 PTY LTD
	National Interest Test Statement This project will provide an evidence base to underpin decision making about seed source provenancing in restoration plantings in the Australian Wet Tropics. Researchers will work closely with restoration practitioners to ensure end-user uptake of the knowledge that is generated. This will provide significant benefits to society by improving the efficacy of reforestation efforts and by ensuring that the most appropriate provenances can be deployed to create self-sustaining forests for the future. The rainforests of the Australian Wet Tropics are highly valued for biodiversity and conservation, and returning degraded lands to rainforest through successful restoration will significantly enrich the Australian forest estate.							
LP190101254 Aikhenvald, Prof Alexandra Y	The project aims to investigate the how the Hmong language survives in the diaspora, with special focus on how the language transforms itself depending on the environment it finds itself in. We focus on the structure and maintenance of Hmong within the immigrant community in North Queensland across several generations of speakers, within the context of multilingual repertoires involving Australian English and Lao. The outcomes will reveal the processes and results of language change such as the emergence of a new blend of Green and White Hmong. The project will provide significant benefits for the maintenance of diasporic Hmong within a larger context of multilingual immigrant communities.	127,195.00	128,995.00	120,445.00	117,345.00	0.00	493,980.00	S.P.K. HOUSING GROUP LIMITED
	National Interest Test Statement Australia is a highly multilingual and multicultural country, with several hundred indigenous and immigrant languages across the nation. The Hmong constitute a closely-knit linguistically diverse community of relatively recent refugees from Laos and of their descendants. Due to the pressure from English, Hmong is no longer acquired by younger generations in its full form. Comprehensive documentation of Hmong and the cultural knowledge embedded in the language will bring social and cultural benefits to the community and to the nation, enhancing cultural and linguistic diversity, cross-cultural understanding and generational continuity. A systematic investigation of a new variety of Hmong developed in North Queensland and of the language across Australia, its comparison with the diasporic Hmong in the USA, and in their south-east Asian homelands will boost the well-being and identity of the Hmong, creating a model for other refugee communities. It will enhance cross-cultural communication within Australia and world-wide, fortifying social and economic links with south-east Asia.							
	James Cook University	277,269.00	300,198.00	209,405.00	117,345.00	0.00	904,217.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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Queensland University of Technology								
LP190100216 Mayes, A/Prof Robyn	This project addresses the crucial and vexed question of why gender inequality remains pervasive and persistent in Science, Technology, Engineering, Mathematics and Medicine (STEMM) workforces, despite substantial and wide-ranging efforts to effect change. Specifically, it examines the systemic causes of gender inequality in hospital and health research environments, a highly under-researched area of national significance. The project will result in critically-informed, pragmatic strategies that enable health service organisations to detect and redress gender inequality. The research advances inclusive and effective STEMM workforces and, ultimately, world-leading health research practice and gender equality in Australia. **National Interest Test Statement** Australia cannot afford to neglect the intellectual contributions of half its population; to do so wastes public investment and poses a threat to the international competitiveness of its translational research. Three quarters of the fastest-growing occupations require STEMM capabilities and the need for a STEMM-qualified workforce is expected to increase in the future. Persistent gender inequalities are at odds with these shifts in labour market and intellectual demands. The results of this project will serve as a call to action in science policy nationally in order to harness the power of gender diversity for expanding the scope of knowledge production, add new perspectives to management and health solutions, and promote collective innovations and discoveries. Significant knowledge translation with project partners and co-development of pragmatic strategies ensures the project will improve gender equality, optimise STEMM research outcomes, and contribute to sustainable health research practice for the benefit of all Australians.	80,170.00	90,480.00	80,792.00	0.00	0.00	251,442.00	QUEENSLAND HEALTH, METRO NORTH HOSPITAL AND HEALTH SERVICE
LP190100677 Dezuanni, A/Prof Michael L	This ethnographic investigation explores the complex relationship between digital and social inclusion, and social infrastructure's role (education facilities, charities, government services) in supporting low-income families' social and economic participation. It gathers insights from families in six diverse communities from Far North Queensland to Tasmania, across diverse urban, regional and rural locations. It focuses on the digital inclusion implications of children's home and school learning experiences, school leavers' transitions into work, and parenting in digital times. The project is a collaboration with Australia's leading digital inclusion organisations and will develop new practices, policies and sector wide solutions. **National Interest Test Statement** The digital exclusion of low-income families is a significant problem for Australia, with over 3 million Australians living below the poverty line, and with research from the Australian Digital Inclusion Index (Thomas et al. 2019) showing that people living on low incomes are amongst the least digitally included Australians. Australia's Tech Future report (Australian Government, 2018) says "All Australians need access to the technologies and the skills required to use them if they're to fully take part in social and economic life". The project's findings will strongly position the Australian charity sector to develop policy, programs and capacity-building activities to empower families at the community level to participate in the digital economy, providing a significant benefit to national productivity across life domains. The project's outcomes have the potential to increase low-income families' social and economic benefits throughout their lives since digital participation has been shown to substantially increase opportunities for, and pathways to, civic engagement, financial stability and wellbeing.	193,140.00	224,947.00	202,678.00	0.00	0.00	620,765.00	THE SMITH FAMILY, YOURTOWN, INFOXCHANGE, GOOD THINGS FOUNDATION LIMITED, LEEP NGO
LP190101100 Richards, A/Prof Kelly R	Young women's contact with justice and welfare agencies has increased rapidly across Australia and the world, creating a crisis that is costly and harmful, especially for young Indigenous women. Pathways into these systems are gendered; but the systems were designed to address the needs of young male offenders. This project therefore aims to discover how these systems could be better designed to improve outcomes for young women. The project uses a novel approach that gives young women a voice in how five Anglicare end-users (the research partners) and other end-users can enhance their service provision in the welfare and justice sectors and become models of best practice.	67,809.00	121,379.00	55,193.00	0.00	0.00	244,381.00	ANGLICARE SOUTHERN QUEENSLAND, ANGLICARE NSW SOUTH NSW WEST AND ACT, ANGLICARE SA LTD., ANGLICARE N.T. LTD., ANGLICARE WA

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	National Interest Test Statement The project will have the social benefit of reducing the contact of young women with the youth justice and community services systems, and improve outcomes for young women involved in these systems. It will significantly impact on the rapidly-increasing economic and social costs of current ineffective responses to young women in the youth justice ecosystem. The POs will be the first point of impact, and will advocate for the uptake of project recommendations for better practice and policy. The project will benefit a wide range of end-users from government and nongovernment service providers across related sectors (eg child protection, education, homelessness) by providing the first insight into how services for at-risk young women can produce better outcomes.							
LP190101301 Thompson, A/Prof Greg	Education systems and teacher unions have long expressed concern regarding the intensification of the demands of teaching and school leadership. Challenges with retaining early career teachers and recruiting new teachers are often blamed on increasing teacher workload and associated burnout. The primary aim of this study is to investigate teachers' work intensification. This will provide important information for systems, unions and schools and suggest areas for intervention at the school and system level. The secondary aim of this study is to examine how teachers manage the intensification of their work, with a particular emphasis on commercial digital tools marketed to them as time saving devices.	52,987.00	64,118.00	65,242.00	50,000.00	0.00	232,347.00	QUEENSLAND TEACHERS UNION OF EMPLOYEES
	National Interest Test Statement Quality teachers are an integral part of a quality education system. There is ongoing concern in Australia regarding the recruitment and retention of high-quality teachers, with research evidence suggesting that workload issues are a significant factor in people either choosing not to pursue a teaching qualification or choosing to leave the profession in the first 5 years of their practice. This project will provide important granular information about teacher workload and work intensification and suggest how schools and systems could respond. It is clearly in the national interest to recruit and retain high-quality teachers.							
	Queensland University of Technology	394,106.00	500,924.00	403,905.00	50,000.00	0.00	1,348,935.00	
The University of Queensland								
LP190100083 Capon, Prof Robert J	There is an urgent need for new antiparasitics to treat multi-drug resistant livestock infections. This project aims to explore the bacteria and fungi present in the microbiomes of heavily infected sheep faeces and pastures, challenging them with environmental cues, including those from associated parasites, to stimulate production of defensive chemicals hidden deep within their genomes. Enabled by an integrated pipeline of high throughput analytical cultivation, molecular networking, and chemical and biological analyses, expected outcomes include an enhanced ability to explore and exploit valuable chemistry hidden within microbial genomes, leading to the discovery of new classes of natural antiparasitic to safeguard livestock.	160,000.00	150,000.00	158,000.00	162,000.00	0.00	630,000.00	BOEHRINGER INGELHEIM PTY LTD
	National Interest Test Statement In controlling parasites, the Australian livestock industry is hostage to the residual efficacy of a few resistance challenged, vintage antiparasitics. As the world population grows and living standards rise, the demand for livestock products surges. To meet demand requires new and improved antiparasitics. New antiparasitics hold the promise of less frequent application with reduced labour costs, less chemical stress on the environment, and an ability to rehabilitate infected pastures previously deemed uneconomic. New antiparasitics can deliver higher per hectare returns, reducing the need for land clearance to offset parasite compromised productivity, while ensuring a more sustainable, productive and humane livestock industry. New antiparasitics increase the competitiveness of the Australian livestock industry, leading to higher export income, to the benefit of farmers and society, as well as the national economy and environment. In addition to new antiparasitics this project will build a highly talented scientific workforce, facilitating future investment in Australian science and agricultural research.							

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LP190100191 Heitzmann, Dr Michael T	In a natural gas wells, sucker rod guides protect the production tubing from wear by the rod string. Premature and erratic failures are costing the industry tens of millions every year. In collaboration with two local SMEs, this project aims to develop the next generation of smart and durable wear guides. The project seeks to understand the complex three body wear mechanisms that drive guide and tubing wear, then use this knowledge to develop new wear resistant compounds and develop a smart guide that provides feedback on its wear state. This will enable the industry partners to supply cutting edge technology to the global oil and gas industry that not only reduces well operation cost but also enhances well resilience. **National Interest Test Statement** Oilfield Piping Systems (OPS) and Duromer are Australian owned and operated SMEs manufacturing companies. New product development and improvements of the existing product portfolio are paramount to drive growth which creates jobs and value-add to the local economy. This project will enable the two project partners to supply superior products to the Australian CSG industry and with the smart wear guide offer a product that revolutionises CSG well maintenance. These products will increase the resilience, safety and reduce operation costs of wells, saving the industry tens of millions every year. Jointly, the project partners have field tested a first generation of improved materials in collaboration with industry primes Santos and Origin. This collaboration which will continue in this project, enables proof testing in some of the most challenging wells in the world. This will not only guarantee rapid industry uptake but also open up global export opportunities. Significant spin-out benefits into related industries/applications also exist further leading to opportunities for job creation and growth.	152,729.00	160,018.00	167,548.00	0.00	0.00	480,295.00	OILFIELD PIPING SYSTEMS PTY LTD, DUROMER PRODUCTS PTY LTD
LP190100240 Potgieter, Dr Andries B	Accurate and timely production estimates are essential to Australia's grain producers and industry to better deal with down side risk caused by climate extremes and market volatilities. However, current systems for predicting crop production are inaccurate and unreliable. This project aims to develop a next generation system for advance and high accuracy predictions for yield, crop type and area at field scale. This will be done by integrating the state of the art global climate models (GCM), biophysical crop modelling, and high-resolution earth observation technologies. This project will deliver a next generation crop prediction system to predict crop production at field scale for improved decision-making and enhancing resilience. **National Interest Test Statement** Forewarned is Forearmed: Foresight of crop size is fundamental to producers and industry in order to better manage and mitigate ebbs and troughs in crop production. Rain-fed grain production in Australia is highly volatile and producers and industry are progressively confronted with uncertainties due to changes and variability in climate, input cost and market price. Furthermore, Australia exports more than 80% of its wheat production, and is a key supplier of high quality and protein content to global markets (>16 M tons/annum (ABARES 2019)). Currently, there is no predictive crop production system that is accessible to whole of industry (Nelson 2018). CropVision is a novel next generation predictive crop production system. CropVision will generate long lead forecasts that will enable more sustainable practices and enhance industry's ability to better deal with natural and economic challenges impacting total crop production at field and farm levels. Finally, this project will support development of new crop insurance products for producers, extending the financial and economic benefits.	180,000.00	156,000.00	161,000.00	141,000.00	0.00	638,000.00	INSTITUTE OF REMOTE SENSING AND DIGITAL EARTH, CHINESE ACADEMY OF SCIENCES, DATAFARMING PTY LTD
LP190100329 Oehmen, Dr Adrian	The recycling of treated wastewater effluents is needed to achieve water security, where very low nitrogen (N) and phosphorus (P) levels must be achieved for wastewater to be effectively recycled. This research investigates a more sustainable and cost-effective N&P removal process from wastewater, benefiting the environment and improving the viability of wastewater recycling. Phosphorus is a limited resource worldwide and will be effectively recovered in the process to be used as a fertiliser. This project develops wastewater treatment process tools, solutions and management strategies that addresses the current challenges of how optimal nutrient removal and recovery from wastewater is achieved, enabling water recycling and saving costs.	121,133.00	132,934.00	134,333.00	0.00	0.00	388,400.00	VEOLIA RESEARCH AND INNOVATION, QUEENSLAND URBAN UTILITIES, SEQWATER

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	National Interest Test Statement Water security is a major concern in Australia, particularly in view of the growing population and increasingly dry and unstable climate, where recycling treated wastewater effluents is a needed solution. Very low N and P limits must be achieved when wastewater is to be recycled, where treatment processes must be technically robust and cost-effective for water recycling to be viable. This research will lead to a more sustainable N&P removal solution for Australia, where publicly-owned utilities will be able to save costs and remove nutrients more effectively, leading to superior environmental protection and enabling wastewater recycling. Furthermore, the P that is removed will be effectively recovered as a fertiliser, which is of high importance since mined phosphate rock is becoming rapidly depleted worldwide, with Australia having low national P reserves and relying largely on imports to support its fertiliser demands. The novel model that will be generated in the scope of this project can lead to commercial opportunities of interest in this area, extending beyond the scope of the current project.							
LP190100761 Henry, Prof Julie D	Social frailty is one of the most troubling and potentially devastating threats to healthy adult ageing, and refers broadly to low social engagement status. This project aims to test how age-related changes in the abilities that allow us to perceive, interpret and process social information drive resilience and risk for this important threat to successful ageing, and then leverage these data to create a training tool that directly targets those abilities identified as being most strongly linked to social frailty. Enhancing older adults' resilience to social frailty should generate significant and far-reaching benefits, including greater independence of ageing Australians, and reduced burden on health and welfare support infrastructure.	72,372.00	72,372.00	99,968.00	99,968.00	116,408.00	461,088.00	MATER RESEARCH LTD, MATER MISERICORDIAE LTD
	National Interest Test Statement Australia's population is ageing, and a vital economic, social and humanitarian goal for our society is therefore to find ways to promote successful ageing. Social frailty broadly refers to low social engagement status, and has been consistently identified as one of the most troubling and potentially devastating threats to normal adult ageing. Because social frailty reflects a dynamic process, whereby individuals can transition to lesser states of frailty, understanding the factors that predict social frailty is the first fundamental step towards determining how this important threat to successful ageing can be addressed: this project will provide this critically needed, evidence-based information. Further, by using these data to develop a training tool designed to boost resilience to social frailty, and which we intend to make available as a freely available resource, the novel technology generated by this project will have enormous outreach potential. This includes being accessible to some of our most vulnerable ageing Australians, such as those living in isolated, underserved communities.							
LP190100830 Huang, Prof Han	Insufficient robustness and durability of the polymeric coatings on precoated metal sheets has resulted in unacceptably high product defects and reject rates. This project aims to develop novel and high performance nanocomposite multilayer coatings through the systematic optimisation of epoxy and polyester/ graphene and nanoclay systems. These complex coatings are expected to have considerably improved toughness, hardness and interfacial adhesion, thus enhancing formability and wear resistance of precoated metal sheets. Successful outcomes from this study will not only solve a long-standing problem in the manufacturing of precoated metals, but generate breakthrough technologies for next-generation nanocomposite coatings.	165,278.00	171,356.00	175,178.00	0.00	0.00	511,812.00	GRAPHENE MANUFACTURING AUSTRALIA PTY LTD, HBIS GROUP CO., LTD.
	National Interest Test Statement Developing new generation high performance coatings for precoated metal sheets is the top priority for global home appliance manufacturers, as the current coating process is neither cost-effective nor environmentally sustainable. With this project, Australia is presented with the opportunity to embrace home-grown nanotechnology in the development of innovative nanocomposite coatings to answer the emerging challenge. Successful outcomes of this research have the potential to impact on a range of industry sectors in Australia. It will improve Australia's capabilities in the design and development of next-generation consumer goods that are environmentally sustainable. The nanocomposite coatings technologies developed will create an enabling platform that links the global manufacturing industries for domestic appliances, automotive and building materials with emerging Australian nanomaterials and nanocomposites start-ups. This will not only benefit the Australian economy but also generate considerable environmental and social benefits to our community.							

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(Columns 1 and 2)	(Column 3)	2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	(Column 9)	(Column 10)
LP190100849 Konarova, Dr Muxina	This project aims to address two major problems simultaneously-reducing the burden of non-recyclable waste currently going to landfill in Australia, and offsetting Australia's reliance on imported diesel to support industry and transport needs. While approximately 95% of diesel consumed in Australia is imported, vast quantities of carbon-based waste ends up in landfill. Municipal Solid Waste (MSW) is a mixture of plant-based waste (including food, garden, paper, and wood) and fossil-fuel derived materials (plastics). Using an innovative and environmentally-sustainable catalytic process, the outcomes of this project are aimed alleviating Australia's dependence on diesel fuel imports and better waste management solutions in Australia. **National Interest Test Statement** In Australia, up to 23 million tonnes of waste goes to landfill every year. The inherent value of this resource, particularly in meeting Australia's energy needs, is lost. Southern Oil Refinery intends to build and operate a waste processing facility using technology to be developed through this project that will convert Municipal Solid Waste (MSW) into diesel fuel. The refinery will be environmentally sustainable, with the potential to create 20 ML of diesel per year (or the equivalent of Australia's annual diesel consumption). Further, the proposed waste processing plants required to collect and ship waste to the refinery for processing will create jobs in regional Australia, both direct (operating and maintaining waste process plants) and indirect (waste collection and transport, sales and management, and other related activities). By creating a market for waste resources, this project will also benefit Australia by reducing pollutant emissions, illegal dumping, and poor waste management practices.	110,000.00	109,000.00	120,000.00	0.00	0.00	339,000.00	SOUTHERN OIL REFINING PTY LTD, NBC MESHTEC INC.
LP190100852 Marcellin, Dr Esteban	Engineering the metabolism of cyanobacteria for industrial production of flavours and fragrances has great commercial potential. Cyanobacteria capture more than 25% of the planet's carbon. Due to their native metabolism and capacity to express complex plant proteins, they represent an attractive Synthetic Biology platform for the biosynthesis of flavours and fragrances. Combining physiological strain characterisation and 'omics studies, new Synthetic Biology strategies and models will be developed. The project aims at engineering a suite of modified freshwater and marine cyanobacteria for flavours and fragrances biosynthesis. The project aims at enabling solar biomanufacturing to underpin the emergence of an advanced Australian bioeconomy. **National Interest Test Statement** Cyanobacteria are the ideal catalysts required for the conversion of Australia's naturally advantaged energy source from the sun and location near Asian markets into a $1bn bio-manufacturing industry. The Project aims to convert CO2 and solar energy into high-value fragrances and flavours. This can be achieved by using cyanobacteria as production catalysts. This project expects to prototype a new generation of improved cyanobacteria production strains by combining Bondi Bioworks' world-leading capabilities in cyanobacteria engineering with UQ and MQU's unique expertise in applying systems and synthetic biology. Our research aims to provide a framework for the development of new technology for flavours and fragrances production and a capability for converting CO2, into value-added products. Altogether the project aims at providing significant benefits, such as advancing Australia's capability for chemical manufacturing and contribute to positioning Australia at the forefront of synthetic biology providing tangible benefits for society.	156,641.00	156,903.00	149,950.00	0.00	0.00	463,494.00	BONDI BIOWORKS PTY LTD
LP190100958 Craik, Prof David J	The aims of the project are to develop robust methods for measuring bioactive pesticidal molecules in butterfly pea cultivars, characterise their modes of action, determine the exposure and persistence of these molecules in field runoff and waterways and, in the longer term, develop butterfly pea cultivars with optimised bioactivity and safety. The major outcome of the project is the generation of new knowledge that will contribute to the development of novel antifungal and insecticidal agents. This outcome is significant as there is a huge need for new pesticidal agents that exhibit wide safety margins, reduce problems associated with resistance to existing treatments, and that are safe for the environment.	156,844.00	156,843.00	145,384.00	0.00	0.00	459,071.00	INNOVATE AG PTY LIMITED, DEPARTMENT OF PRIMARY INDUSTRIES - NSW

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	National Interest Test Statement The anticipated outcomes of the proposed project are to discover and then tangibly exploit new knowledge on plant defence mechanisms by translating this knowledge in the development of novel pesticidal and antifungal agents. The potential practical applications of this knowledge include the protection of a wide variety of crops in Australia from insects and fungal pathogens, and so the project aims to generate significant and wide-reaching economic, social and environmental benefits.							
LP190100975 Huang, Prof Dr Longbin	Conventional methods of bauxite residue rehabilitation require expensive and unsustainable covering topsoil. Building on recent breakthroughs in eco-engineering tailings into soil, the project aims to develop a field-based technology using marine microbes and halophytic plants to accelerate in-situ soil formation from bauxite residues (incl seawater neutralised bauxite residues) under field conditions. The technology will be underpinned by understanding the roles of marine microbe consortia and eco-engineering inputs in accelerating key mineralogical, geochemical, physical and biological changes in bauxite residues. This technology is expected to be transferable and adaptable across other alumina refineries in Australia.	239,293.00	179,293.00	179,293.00	179,293.00	0.00	777,172.00	QUEENSLAND ALUMINA LIMITED, RTA YARWUN PTY LTD
	National Interest Test Statement This project falls within Australian Science and Research Priority areas of “Resource”: (1) knowledge of environmental issues associated with resource extraction and (2) technologies to optimise yield through effective and efficient waste management; and “Soil and water”: minimising damage to, and developing solutions for restoration and remediation of, soil, urban catchments and marine systems. Australia is the 2nd largest alumina producer, with >20% of global production. However, the large and growing issue of bauxite residues (BR) that fail to rehabilitate endangers the sector’s “social license to operate”. The current cost for rehabilitating about 6000 ha BR landscapes in Australia are estimated to be $7 billion if using conventional geo-membrane capping and soil cover. The new technology of eco-engineering soil from BR is expected to deliver 50-70% savings (i.e. a saving of $3.5-5 billion) if adopted across the 6 refineries in Australia. The new field-based technology will provide local employment opportunities for local communities, thus helping socio-economic transition in refinery closure phase.							
LP190100998 Wang, Dr Yifan	On the basis of the cutting-edge and concept-proofed beam-steerable antenna invented by the team, this project aims at tackling the system-level challenges and developing a commercial-ready millimeter-wave satellite terminal to deal with the digital inequality facing rural and remote Australia. The proposed terminal can lead to a household-affordable price system that is compact and can be installed on a fixed/mobile platform for broadband connectivity. The project will have an immediate socio-economic impact for families and small businesses located in rural areas in Australia that have poor digital access, meanwhile, it has great potential to transform the local industry partner' business into a highly profitable emerging market.	100,000.00	95,000.00	95,000.00	0.00	0.00	290,000.00	E M SOLUTIONS PTY LTD
	National Interest Test Statement The proposed broadband satellite terminal, which is affordable for households and small businesses in Australia, enables low-cost broadband digital access to everyone and everywhere, especially communities living in the bush and remote areas that lack broadband terrestrial communications networks. Moreover, due to the compact size of the terminal, it can be integrated into various mobile platforms to serve end-users who are traveling to those remote areas. The outcomes of this project will provide rural communities with broadband low-earth-orbit satellite-enabled access to e-health services, distance education, and entertainment. As well as improved quality of life, such digital accessibility will help create more jobs in those regions and help to narrow digital inequality. The greatest social impact would be applied in the following domains of economics: 1) Health Care 2) Distance education 3) Tourism and 4) Agriculture.							

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LP190101020 Jak, Prof Evgueni	Copper, nickel, cobalt, chromium and tin metals are essential for the manufacture of new battery materials, electrical and electronic devices and technologies that will enable the global transition to sustainable energy systems. There are major technical challenges associated with the industrial scale high temperature production, separation and recycling of these metals. The aim of the present study is develop advanced chemical thermodynamic databases and models that can be used to predict the outcomes of these complex chemical reactions, and in doing so provide the industry with the vital fundamental scientific information and tools needed to be able to design and improve new, more efficient metal production and recycling technologies.	185,547.00	178,652.00	202,065.00	0.00	0.00	566,264.00	UMICORE NV, AURUBIS AG, BHP BILLITON OLYMPIC DAM CORPORATION PTY LTD, ANGLO AMERICAN, BOLIDEN GROUP, OUTOTEC (FINLAND) OY , RHI MAGNESITA GMBH, GLENCORE TECHNOLOGY PTY LIMITED, RIO TINTO COPPER AND DIAMONDS
	National Interest Test Statement Copper, nickel, cobalt, chromium and tin metals, and compounds of these metal, are key chemical components that will be used in the emerging new technologies, such as, electric powered vehicles, advanced battery technologies and fuel cells. Australia, as a major exporter of minerals and mineral products, is well placed to expand production of these primary metals into this market. The present project will provide important scientific and technical information to support the development of new more efficient separation and processing technologies for the production, refining and export of these important metals to world markets. Australia also consumes manufactured products containing these valuable metals and has a responsibility for the stewardship of these finite metal resources. The present project will provide the scientific basis required for the development of technologies for the treatment of end of life devices and industrial wastes, thereby providing pathways for the efficient recycling and recovery of these metals, for reuse as part the contribution to circular economy and resource conservation.							
LP190101051 Carah, Dr Nicholas	This project aims to determine how young people engage with alcohol and nightlife marketing on social media platforms like Facebook, Instagram, and Snapchat. Companies now leverage the power of social media to create advertisements that are made and shared by young people, targeted to them in particular times, places and contexts, and are thus difficult to monitor and regulate. The project will use computational, big social data approaches and youth informants to assess the pervasiveness of branding on social media and how it shapes youth cultures. This work will extend media and cultural studies and support the development of effective monitoring and regulation of online marketing in general, with a particular focus on alcohol.	64,765.00	97,908.00	103,276.00	0.00	0.00	265,949.00	FOUNDATION FOR ALCOHOL RESEARCH AND EDUCATION LIMITED
	National Interest Test Statement Young Australians are avid users of social media like Instagram, Facebook and Snapchat. On social media young people participate in alcohol marketing by sharing images of, and generating data about, their drinking practices. Young people exposed to alcohol advertising are more likely to have problematic drinking behaviours. Yet, according to the ACCC's Digital Platforms Inquiry there is limited public oversight of marketing on these platforms in Australia, and our regulatory frameworks are inadequate. The project will show how young people are targeted by and participate in alcohol marketing on social media. The research will inform public debate about marketing on social media, and enable our Partner Organisation the Foundation for Alcohol Research and Education—along with public health, civil society, and consumer advocacy groups—to develop frameworks that make social media platforms accountable to the public. By contributing to efforts to reduce harm caused by alcohol, the project will benefit Australian society through improved wellbeing and the economy through reduced health costs.							
LP190101070 Kemp, Prof Deanna L	Mineral resource extraction is increasingly contentious and conflictual. Leading global companies are responding to high profile issues by commissioning independent inquiries into past events with the reports released publicly. Little is known about the governance arrangements of these inquiries, their independence, or their role in stimulating change. This project aims to investigate the utility of independent inquiries commissioned by global mining companies for different stakeholder groups. By drawing comparisons with government-led commissions of inquiry, the project aims to develop guidelines for industry inquiries to achieve meaningful change and improve resource governance outcomes globally.	102,604.00	110,782.00	118,339.00	0.00	0.00	331,725.00	RESOLVE, NEWMONT GOLDCORP CORPORATION

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	National Interest Test Statement In an age of unparalleled consumption and climate uncertainty, the link between resource extraction and socio-ecological impact is critical. This link is overt in mining, where impacts are increasingly subject to public scrutiny and community protest. Although the global resources industry generates macro-economic benefits for Australia, this scrutiny has recently intensified as human rights advocacy, public transparency initiatives, and the climate impacts of large-scale mining converge. Supporting innovative forms of stakeholder engagement – including new forms of public inquiry – promises to boost the global resources industry's contribution to Australia's national interests. Through this ground-breaking project, new tools and techniques will improve Australia's ability to maximise its natural resource endowment in a way that reduces conflict, respects human rights, and safeguards our natural assets for future generations.							
LP190101124 Mueller, Prof Jochen F	This project aims to utilise the Australian Census 2021, a unique opportunity to link exposure to chemical and biological hazards with catchment socio-demographic data via systematic wastewater analysis. The project is expected to advance our capabilities to identify emerging hazards and understand factors that affect spatiotemporal trends in hazards across Australia. Moreover, in a world first, the project aims to assess chemical fate on a national level by linking sales/use with fate and release from wastewater treatment plants and assess treatment efficiency at >100 plants around Australia. The project expects to provide insight for government, wastewater managers and industry into hazards that may affect environmental and human health.	200,642.00	214,654.00	72,808.00	75,308.00	0.00	563,412.00	QUEENSLAND HEALTH, MELBOURNE WATER CORPORATION, QUEENSLAND URBAN UTILITIES, ENVIRONMENT PROTECTION AUTHORITY VICTORIA, UNILEVER RESEARCH AND DEVELOPMENT, HEALTHY LAND AND WATER LTD, DEPARTMENT OF ENVIRONMENT AND SCIENCE, STOCKHOLM UNIVERSITY, SWEDEN, UNIVERSITY OF ANTWERP, BELGIUM, CSIRO, AUSTRALIAN CRIMINAL INTELLIGENCE COMMISSION, WATER RESEARCH AUSTRALIA LIMITED
	National Interest Test Statement Systematic sampling and analysis of wastewater has been rapidly adopted by Australian government agencies to provide objective and near real-time information on spatiotemporal trends in drug use in the Australian population. However, it has been shown that the approach has much wider application, providing information on exposure to a wide range of chemical and biological hazards including emerging hazards. With nationwide engagement of more than 100 wastewater treatment plants covering over 60% of the population, this project is expected to provide essential data on hazard loads and their fate in wastewater treatment plants, including treatment efficacy. The benefits to the Australian community from the project cover health and social benefits associated with understanding factors that affect substance abuse and exposure, and providing tools for assessing intervention. Furthermore, there are benefits to the environment and economy through understanding treatment efficiency for chemical hazards, as evidenced by the participation of many water authorities and environmental protection agencies in this project.							
LP190101130 Nielsen, Prof Peter	This project aims to develop the first management strategies for coastal flow slides. This project expects to generate new knowledge on how flow slides are triggered, propagate inland and undermine structures. Expected outcomes include globally applicable novel models and management approaches developed by an interdisciplinary team of coastal and geotechnical engineers and coastal geomorphologist using innovative data. This is likely to provide significant benefits for planning and managing structures along coasts and bays against destructive flow slides. The project will enable the design and implementation of coastal works to protect existing structures against flow slides risks emerging with rising sea level.	116,990.00	86,831.00	94,801.00	0.00	0.00	298,622.00	REDLAND CITY COUNCIL
	National Interest Test Statement Coastal flow slides, which are an energetic from of coastal erosion, represent a major threat to Australian private properties, government and private coastal and marine infrastructure (e.g., coastal roads, port facilities and navigation channels) and coastal tourism. As sea level rises, causing faster tidal channel flows in ports, bays, harbours and estuaries, the threats from coastal flow slides are increasing, thus reducing Australia's coastal resilience. This project has access to a unique experimental site which means there is a high potential for new engineering tools to be created and validated. This would facilitate resilient and sustainable communities by mitigating existing damage from optimised works and through avoiding future damage from coastal flow slides. The objectives provide substantial social (including first nation involvement), economic and environmental benefit to Australian governments, private operators and coastal communities, and deliver new scientific and engineering knowledge directly applicable to managing environmental change both nationally and internationally.							

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LP190101159 Bowen, Prof Warwick P	This project aims to build the first scalable computing architecture based on nanomechanical motion, integrated on a silicon chip and proven in harsh environments. This could extend the performance of computers in space and high-radiation environments, e.g. allowing robust satellite stabilisation. The project will leverage our know-how in phononics and nanofabrication to enable previously unprecedented control of nanomechanical motion, and exquisitely low energy dissipation. It aims to construct a nanomechanical processor capable of digital servo control, built from nanomechanical waveguides, transistors, logic gates and analogue-to-digital converters. It will also develop reversible logic gates, a key step towards ultralow-power computing. **National Interest Test Statement** This new approach to computing has potential for near-term commercial impact in the aerospace industry, building on Australian know-how and a strong relationship with global leader Lockheed Martin who are committed to commercialisation in Australia. Even relatively simple nanomechanical systems, such as the digital servos we aim to develop, could replace critical semiconductor electronics in space and earth-orbit applications, and in other environments where intense radiation causes digital electronics to fail. Global positioning satellite outages from a 100-year solar flare, alone, are predicted to cause >$1 trillion in damage, leaving millions without power/communications for months or years. Addressing this risk presents societal, national security and commercial opportunities. Moreover, the underpinning nanotechnologies developed in this project have broad applications in sensing, energy, health and communications, addressing a >$50 billion market. For example, they could improve heat management and energy efficiency in future semiconductor computers, which already use 10% of world electricity.	106,441.00	111,750.00	214,902.00	174,747.00	173,077.00	780,917.00	LOCKHEED MARTIN CORPORATION
LP190101161 Roura, Prof Eugeni	Antimicrobial resistance has become a major issue in human and veterinary medicine being partially caused by the use of in-feed antimicrobials in farm animals. This project aims to completely eliminate antimicrobials from piglet feeds. The key differential approach is based on helping the physiology of the animal rather than testing interventions against bacteria. The project will consist of developing a novel nutritional strategy of naturally (through maternal conditioning) boosting the natural appetite and the capacity to digest in piglets early in life. The anticipated outcome is that the new peri-natal program will result in minimal bacterial proliferation and diarrhoea thus, negating the need for in-feed antimicrobials in piglets. **National Interest Test Statement** This project addresses one of the fundamental contemporary farm animal industry conundrums with a very high social impact: the use of in-feed antibiotics. The use of antimicrobials in animal feeds have been associated with antimicrobial resistance affecting both veterinary and human medicines. Antimicrobials used in feed also include ZnO, one major soil/water pollutant. Consequently, there is an increasing consumer demand for stopping the use of antimicrobials in farm animal production. The project will highly benefit the Australian pig industry since a poorly managed removal of all in-feed antimicrobials could cost the Australian pig industry around $26M p.a. Furthermore, the removal of in-feed antimicrobial ‘per se’ would save the Australian pig industry around AU$8M p.a. Thus, the project outcomes will benefit the partner organisations (PO), as well as the broader pig industry and the general community.	213,000.00	213,000.00	213,000.00	213,000.00	0.00	852,000.00	DSM NUTRITIONAL PRODUCTS, SUNPORK PTY LTD, AUSTRALASIAN PORK RESEARCH INSTITUTE LTD
LP190101262 Yuan, Prof Zhiguo	Ventilation is one of the key technologies for sewer corrosion control. However, its design and operation are currently based on experience and empirical equations, often leading to unsatisfactory results. By integrating in-depth laboratory and pilot-sewer studies under defined conditions with extensive field investigations, this multidisciplinary project aims to develop critical models to predict the corrosion process in response to ventilation and dynamic wastewater and atmospheric conditions, enabling model-based sewer ventilation design and operation. The project also aims to deliver novel, field-demonstrated ventilation strategies. The project findings will be incorporated in the Australian ventilation design and operation guidelines.	294,902.00	232,684.00	274,413.00	0.00	0.00	801,999.00	QUEENSLAND URBAN UTILITIES, MELBOURNE WATER CORPORATION, DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY, WATER CORPORATION

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	National Interest Test Statement Sewer networks are a critical part of our urban infrastructure. Australia has over 110,000 km sewer pipes with a total asset value of $35 billion. Concrete is the most commonly used material for large sewers due to its strength and durability. However, concrete sewers are prone to sulfide-induced corrosion, costing Australian water utilities hundreds of millions of dollars each year for repair and maintenance. Ventilation is one of the key technologies for sewer corrosion control. However, its design and operation are currently based on experience and empirical equations, often leading to unsatisfactory results. This project aims to generate critical knowledge and predictive models for optimal design and operation of sewer ventilation systems, and to develop and demonstrate novel dynamic ventilation strategies to reduce sewer corrosion. By extending service life of our sewer networks, this project will deliver large economic benefits to Australia. Well-operated ventilation will also reduce odour emissions from sewers, thus delivering social and environmental benefits as well.							
LP190101279 Yu, Prof Chengzhong	This project aims to develop a new generation of high performance and low-cost cathode materials for rechargeable aluminium ion batteries. To address the low capacity issue of current cathodes, this project anticipates to generate new knowledge in the material design of novel graphene materials. By developing an innovative surface perforation technique coupled in a continuous production process, this project expects to produce scalable and cost-effective graphene cathodes with a record-high capacity. Expected outcomes of this project include industrial adaptable manufacturing processing and advanced materials for aluminium ion batteries, thus increasing the competitiveness of the partner organisation in the rapid growing graphene market.	131,674.00	129,245.00	129,221.00	0.00	0.00	390,140.00	GRAPHENE MANUFACTURING AUSTRALIA PTY LTD
	National Interest Test Statement The global rechargeable battery market is predicted to grow at an annual rate of ~7% in the next 5 years to over AU$ 200 billion by 2024. This project aims to develop a high performance and low-cost graphene as cathode materials and an advanced continuous manufacturing technique to enable next-generation aluminium-ion batteries, a future energy storage technology to replace lithium ion batteries. New understanding of the relationship between battery performance and the structure of novel graphene cathodes will help guide the rational design of next-generation graphene materials for rechargeable aluminium-ion batteries. This project is expected to improve the Australian partner organisation’s manufacturing capability and create a new market for their graphene products. On completion, the project is likely to generate IP and attract commercial interest, supporting and enhancing Australia's market position in rechargeable batteries. It will also train researchers and provide them with multidisciplinary skills in state-of-the-art nanotechnology to solve problems for industry and society.							
	The University of Queensland	3,030,855.00	2,915,225.00	3,008,479.00	1,045,316.00	289,485.00	10,289,360.00	
	Queensland	4,387,383.00	4,470,414.00	4,357,296.00	1,212,661.00	289,485.00	14,717,239.00	

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South Australia								
Flinders University								
LP190100713 Werner, Prof Adrian D	In arid and semi-arid climates, aquatic and terrestrial ecosystems often rely on groundwater springs. Spring hydrology depends on complex relationships between underlying aquifers and surface conditions, leading to high uncertainties in understanding aquifer-spring-wetland hydrology, which is critical for spring ecosystem protection and to inform management of relevant groundwater-affecting activities. This project will apply novel hydrogeophysical and hydrochemical methods, and computer modelling, to investigate the source aquifer of, and fate of discharge from the Doongmabulla Springs Complex (DSC), located in an area of future development. Project results will inform spring vulnerability to development pressures and climate effects.	122,594.00	110,368.00	107,395.00	0.00	0.00	340,357.00	BUSINESS SERVICES OF COAST AND COUNTRY INC
	National Interest Test Statement The improved knowledge of hydrologic relationships between the Doongmabulla Springs Complex (DSC), surrounding aquifers and surface water systems, arising from this project, responds to existing high uncertainties in the potential impacts to the DSC from proposed groundwater-affecting enterprises in this region. As such, the project is expected to contribute to Australia's national interests through economic, environmental, social and cultural benefits to the Australian community, as follows: (1) Informed planning of development in this region will benefit from reduced uncertainty of hydrogeological linkages between aquifers, springs and surface ecosystems. (2) Improved knowledge of the DSC, and spring-aquifer relationships and methods of assessment more generally will assist in protecting nationally important environments. (3) Spring discharge has created culturally significant sites of high ecological value (4) Recreational uses of, and landholder dependency on, discharge from the DSC are experienced locally and downstream in the Carmichael River.							
LP190100933 Pring, Prof Allan	In this project we aim to explore and define the effects of the substitution of lead and rare earths on the crystal chemistry of uranium dioxide (uraninite) and related minerals, towards establishing the oxygen stoichiometry (as a measure of oxygen fugacity) of these materials both in nature and in synthetic materials. This project will use synthetic materials to understand the variability of oxygen stoichiometry, establish accurate and precise structures for the oxides, and distinguish both long range and short-range order which is critical to understanding both natural and synthetic U-oxides. This will help to define the geochemical conditions leading to the formation of deposits like Olympic Dam towards potential economic benefit.	128,000.00	128,000.00	129,000.00	0.00	0.00	385,000.00	BHP BILLITON OLYMPIC DAM CORPORATION PTY LTD
	National Interest Test Statement This project falls within the current National Science and Research Priorities – Resources Technologies to optimise yield through effective and efficient resource extraction, processing and waste management. A significant innovation of this project is a detailed understanding of the chemical controls on the mechanism of uraninite oxidation and remobilization. This knowledge will help to define the geochemical conditions over the evolution of Olympic Dam and other IOCG deposits in the Gawler Craton of South Australia. This will feed into improved models for exploration in this region and the discovery of further large IOGC system. The research may underpin new developments for the recovery or suppression of uranium and rare earth elements in processing IOCG ores, which has major economic implications.							
	Flinders University	250,594.00	238,368.00	236,395.00	0.00	0.00	725,357.00	

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(Columns 1 and 2)	(Column 3)	2020-21 (Column 4)	2021-22 (Column 5)	2022-23 (Column 6)	2023-24* (Column 7)	2024-25* (Column 8)	(Column 9)	(Column 10)
The University of Adelaide								
LP190100419 Corn, Prof Aaron D	This Project will explore innovative heritage and commercial applications for the 3D modelling and printing of custom musical instruments to advance Australia's flexible-manufacturing industry. Musical instruments are complex devices, often made with multiple parts and/or materials, that are commonly built to produce sound through a multitude of manufacturing processes to meet high-performance requirements. When hand-crafted, they can present considerable morphological variations, even within a single instrument type. The Project's novel challenge of flexibly manufacturing custom music instruments to meet a diversity of end-user needs will create new digital heritage strategies and market opportunities for Australian research end-users. **National Interest Test Statement** The proposed research will bring substantial economic, commercial, social and cultural benefits to the Australian community by scaling up Australia's flexible-manufacturing industry. The Project's novel challenge of flexibly manufacturing custom musical instruments to meet diverse end-user needs will markedly strengthen the international competitiveness of this industry in Australia by exploring innovative heritage and commercial applications. Advanced 3D-printing materials will be trialled to flexibly manufacture different instruments more affordably, more durably and with better resonant qualities. Australian collecting institutions will gain the industry advantage of being first movers in Australia in commericialising their own flexibly-manufactured musical instruments, and will collaborate in creating innovative new digital-heritage strategies to safeguard against cultural endangerment and loss. The Project will provide beneficial peer research training to Indigenous end-users, thereby facilitating an unprecedented transfer of highly-desirable knowledge and skills into a remote Indigenous community.	52,179.00	62,849.00	0.00	0.00	0.00	115,028.00	BUKU LARRNGGAY MULKA INCORPORATED, SOUTH AUSTRALIAN MUSEUM
LP190100864 Chousalkar, A/Prof Kapil	The central aim of this project is to increase the antigenicity of aroA mutant Salmonella Typhimurium vaccines, in particular Bioproperties' Vaxsafe® ST. Increased antigenicity will affect the gut microbiota and stimulate a stronger host immune response improving vaccine efficacy and the duration of protection against S. Typhimurium in poultry. This will ultimately reduce bacterial loads in the farm environment, mitigate downstream contamination of the food supply chain, and reduce the number of human salmonellosis cases. **National Interest Test Statement** With an increasing human population in a changing environment, the challenges to produce safe, high quality food will also increase. Consumer demand for improved animal welfare may create farm environments that may affect how zoonotic, foodborne pathogens, such as Salmonella Typhimurium contaminate food. Consumption of poultry meat and eggs is increasing and this increase is projected to continue. Thus control of S. Typhimurium on farms is critical to maintain a safe food supply. The outcomes of this project will improve S. Typhimurium vaccination of poultry and ultimately improve food safety. Improving the efficacy of the Vaxsafe® ST vaccine would have a significant positive outcome for commercial distribution of the vaccine.	130,000.00	130,000.00	130,000.00	0.00	0.00	390,000.00	BIOPROPERTIES PTY. LTD.
	The University of Adelaide	182,179.00	192,849.00	130,000.00	0.00	0.00	505,028.00	
University of South Australia								
LP190100287 Bryant, A/Prof Lia	This project addresses the urgent issue of post-parental care plans for people with an intellectual disability and their older parental carers in rural areas. The project aims to co-design a post-parental care planning approach and resources in collaboration with people with an intellectual disability, older parental carers and disability services. The results will be used by the researchers to generate new knowledge on post-parental care transitions and how to construct post-parental care plans within the context of the National Disability Insurance Scheme. The planning approach and resources will assist families and services to avert crisis transitions through improved coordination, preparation and support for post-parental care.	77,581.00	78,772.00	0.00	0.00	0.00	156,353.00	UNITING COMMUNITIES INCORPORATED, BAPTCARE LTD

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	National Interest Test Statement This project will develop best practice in post-parental care planning for uptake by the social service sector. It will contribute social benefits to the Australian community by averting crises when older parents can no longer provide care in the family home through an approach and resource that assist people with an intellectual disability to formally plan for future care arrangements with their family and service providers. The economic and social benefits of providing social service organisations with user-centered planning resources is that early intervention plans will alleviate social service system strain caused by emergency placements, optimize care transitions allowing for choice and control and improve support for the social care needs of people ageing with intellectual disabilities.							
LP190100376 O'Boyle, A/Prof Ian	This project aims to investigate the impact on individual wellbeing through use of public aquatic and recreation centres in Australia. Through the use of mixed methods across multiple locations, the project expects to generate new knowledge on the effect on users of different management and service models for the provision of aquatic and recreational infrastructure. Expected outcomes include a quantifiable measure of social and emotional wellbeing that can be utilised by centre management and government. This will help assessment of best practice for maximising community wellbeing, and can guide investment decisions by state and local government.	126,138.00	150,148.00	112,975.00	0.00	0.00	389,261.00	SA AQUATIC AND LEISURE CENTRE, BELGRAVIA LEISURE, MONASH CITY COUNCIL, TOOWOOMBA REGIONAL COUNCIL, ACT PROPERTY GROUP, SOUTHERN GRAMPIANS SHIRE COUNCIL, TOWN OF PORT HEDLAND
	National Interest Test Statement Australia is confronted by a rising tide of mental health issues and decreasing level of community wellbeing. Australia needs to identify and promote pathways to ensure community and individual wellbeing, but too little is known about which types of investment deliver the outcomes we seek. Public aquatic and recreational centres are critical pieces of infrastructure within local and state government jurisdictions attracting significant public spending, yet the actual benefits to users at the individual level in relation to wellbeing is unknown. This research addresses this, focusing on the impact of one type of community infrastructure – public aquatic and recreation centres – and their contribution to the wellbeing of individuals and Australian communities. Project outcomes will provide the tools necessary to quantify the effect of investment in this area on wellbeing. New knowledge generated through the project will also show how benefits from aquatic and recreational infrastructure are affected by different management and governance models, offering valuable evidence for government decision-makers.							
LP190100586 Connor, Prof Jeffery D	This project aims to develop a land sector greenhouse gas abatement, food production and environmental economics model for NSW. We expect to identify innovation in carbon payment policy and brokerage business models to achieve agricultural GHG abatement, while simultaneously improving sustainability. Expected outcomes include evaluation of the innovations of expert landholders, related businesses and governments to find ways to influence land use decisions. This should provide significant benefits to landholders, governments involved in land management and the public through increased productivity, profitability, biodiversity and ecosystem health in the context of future climate, agricultural commodity and carbon market uncertainties.	63,824.00	74,210.00	63,824.00	0.00	0.00	201,858.00	DEPARTMENT OF PRIMARY INDUSTRIES - NSW
	National Interest Test Statement This project is designed to address Australia's Environmental Change National Science and Research Priority by enabling improved economic and ecological sustainability futures for the agricultural and pastoral lands of NSW. It serves the national interest by providing communities, government decision makers, the media and the broader public with the scientifically robust information required for economically and ecologically resilient adaptation possibilities in the face of changing and variable market, policy and climate conditions. The project aligns with the practical challenge to, "build Australia's capacity to respond to environmental change and integrate research outcomes from biological, physical, social and economic systems", through the creation of a legacy of science excellence and building the capacity of academic, government, and industry experts. The potential scale of benefit is substantial considering that if innovations identified through this project were to enhance the 2017 NSW agricultural gross value by 1/10th of one percent, this would represent a $15.4 million dollar annual benefit.							

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LP190100740 Ziaian, A/Prof Tahereh	This project aims to provide a comprehensive understanding of refugee and migrant youth settlement experiences and its impact on psychological wellbeing and the role of support services. It will focus on the policies and practices that shape the settlement experiences of refugee and migrant youth which promote their psychological wellbeing. The study will provide settlement sectors and service providers with crucial new knowledge of how settlement policies and practices can foster refugee and migrant psychological wellbeing. Outcomes of this project will include the development of research-based guides to good policy and practice in settlement services to improve psychological wellbeing outcomes for immigrant communities.	204,935.00	287,271.00	218,683.00	0.00	0.00	710,889.00	AUSTRALIAN MIGRANT RESOURCE CENTRE, MULTICULTURAL YOUTH SOUTH AUSTRALIA INCORPORATED, NEWCOMER CENTRE OF PEEL, INSTITUTE FOR MULTICULTURAL COUNSELING AND EDUCATION SERVICES
	National Interest Test Statement This study will provide data on the settlement experiences of refugee and migrant youth that is affecting their psychological wellbeing, and the extent to which these youth are receiving appropriate help and support to reach their maximum potential for a prosperous life. These youth are a population group with complex and multifaceted issues and require greater access to mental health care systems that are already overburdened. This research directly addresses their needs as key members of families to be considered in efforts to develop healthier and more resilient communities. Successful settlement is a critical issue related to Australia's immigration policies.The study has a strong applied focus to inform education, prevention, and remedial services for refugee and migrant youth whose life experiences may result in social disparities and particular vulnerabilities related to mental health. It will enhance the settlement experiences and in turn, future psychological health and wellbeing of current and future refugee and migrant youth and promote a more tolerant and inclusive multicultural Australia.							
	University of South Australia	472,478.00	590,401.00	395,482.00	0.00	0.00	1,458,361.00	
	South Australia	905,251.00	1,021,618.00	761,877.00	0.00	0.00	2,688,746.00	

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Tasmania								
University of Tasmania								
LP190101116 Leane, Prof Elizabeth M	With the Antarctic tourist industry currently growing and diversifying, the project aims to discover how cruise operators can foster positive and culturally informed relationships with the region among visitors of different national backgrounds. Through extensive in-situ fieldwork with partner Intrepid Travel, the project expects to generate new understandings of how operators' active mediating role combines with multisensory experience of Antarctica to forge human connections with this extreme but fragile place. Anticipated outcomes include protocols for best practice in designing and implementing tourist experiences. By encouraging diverse visitors to value Antarctica, the project should benefit both operators and the polar environment. **National Interest Test Statement** Australia has a large territorial claim on Antarctica and is highly invested in the region's future, frequently playing a central role in political, legal, and environmental debates relating to the continent. A number of Australian-owned and -run tour companies operate in the Antarctic Peninsula area and potential exists for increased Antarctic and Sub-Antarctic tourism directly from Australia. However, the rapid growth and diversification of the industry has raised concerns about its impact on Antarctica's relatively pristine icescape. This project will deliver a best practice framework for facilitating visitor experiences that foster understanding and appreciation of the Antarctic environment across a culturally diverse customer base. The capacity to deliver evidence-based, enhanced visitor experiences will help the project partner, Australian company Intrepid Travel, to strengthen its credentials as a sustainable and culturally aware operator and to lead industry-wide change. In turn, visitor experiences will broaden public understanding of the need to value and protect the unique Antarctic environment.	50,000.00	50,000.00	0.00	0.00	0.00	100,000.00	INTREPID TRAVEL PTY. LTD.
	University of Tasmania	50,000.00	50,000.00	0.00	0.00	0.00	100,000.00	
	Tasmania	50,000.00	50,000.00	0.00	0.00	0.00	100,000.00	

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Victoria								
Deakin University								
LP190100844 Venn, Dr Susanna E	In this project, we aim to build resilience into alpine National Parks and Alpine Resorts to counter the effects of ongoing declines in snow. Alpine environments depend on snow to regulate water flows, insulate vegetation, control soil erosion and promote proper ecosystem functioning. How these processes will operate in a snow-free future is unknown. We will determine how and where snow characteristics drive soil water availability for plants and which plant species have the best adaptation and regeneration potential under extreme conditions such as heat, frost and drought. Benefits of the project include innovative land management and rehabilitation solutions, to safeguard Australia's alpine areas under changing environmental conditions.	168,980.00	104,556.00	106,724.00	0.00	0.00	380,260.00	ROYAL BOTANIC GARDENS AND NATIONAL HERBARIUM OF VICTORIA, SOUTHERN ALPINE RESORT MANAGEMENT BOARD, PARKS VICTORIA, MOUNT HOTHAM ALPINE RESORT MANAGEMENT BOARD, LIZ MACPHEE ALPINE FLORA
	National Interest Test Statement The catchments of the Australian Alps provide enormous economic, environmental, social and cultural benefits to the Australian community and industry. The Alps provide over half of the river flows to the Murray-Darling Basin and snowmelt water for Australia's largest energy store, hydroelectricity, and downstream irrigators. The region also hosts >5M visitors annually for various recreation, cultural and social activities. These services all depend on reliable snowcover which protects and insulates alpine soils and vegetation, prevents soil erosion and provides the basis for ecological processes. This project will build resilience into alpine environments through underpinning rehabilitation works with ecological understanding: how changes in snowpack and soil water availability will affect alpine vegetation; how plants will tolerate climate extremes and which plants can adapt and regenerate to maintain properly functioning alpine environments. Benefits of the project include innovative land management and rehabilitation solutions, to safeguard Australia's alpine areas under changing environmental conditions.							
	Deakin University	168,980.00	104,556.00	106,724.00	0.00	0.00	380,260.00	
La Trobe University								
LP190100698 Laslett, Dr Anne-Marie L	This project aims to generate understanding of the magnitude, character, economic burden, disparities and precipitants of occurrence of alcohol's harm to others across Australia, using a national survey, crime, community services and health data and qualitative interviews. The project outcome will be a robust current evidence base for our partners, government and Australian society to underpin advocacy, policy and planning, aimed at reducing alcohol-related harm and suffering.	166,926.00	237,491.00	98,084.00	0.00	0.00	502,501.00	FOUNDATION FOR ALCOHOL RESEARCH AND EDUCATION LIMITED, AUSTRALIAN INSTITUTE OF FAMILY STUDIES, MONASH HEALTH, THE AUSTRALASIAN COLLEGE FOR EMERGENCY MEDICINE, ALCOHOL AND DRUG FOUNDATION INCORPORATED, THE TRUSTEE FOR AUSTRALIAN RECHABITE FOUNDATION

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	National Interest Test Statement The social cost of alcohol to Australian society was estimated at around $14.4 billion in 2017. But this estimate primarily measures costs to governments and drinkers, not interpersonal costs. Given that research conducted in 2008 found 8.1 million adults were directly negatively affected by others' drinking in Australia, the burden of alcohol's harm to others' is a significant social problem for Australian society. This project will benefit the Australian community by informing decision-makers, policy-makers and service and program planners of the burden, costs, distribution and precipitants of alcohol's harm to others. Comprehensive understanding of the situations in which harm occurs in Australian society and of who is most affected is essential for effective development and evaluation of alcohol and other social and health response systems and policies. This research contributes to Australia's national interest through its potential to estimate, understand, evaluate and reduce the economic and social burden of alcohol use, not just to drinkers themselves, but to those harmed by someone else's drinking.							
LP190100865 Jones, Dr Timothy W	Research has demonstrated that attempts to change the sexual and gender orientation of LGBT people do not work, but little is known about their impacts or the extent of their practice in Australia. This project aims to investigate the history, scale and nature of LGBT conversion therapy in Australia. Robust data on Australian conversion practices will be collected through a national survey, life history interviews and focus groups with spiritual and mental health care providers. These data will be used to establish the impacts of conversion practices and develop resources to support improved spiritual care of LGBT people. The findings will benefit society, supporting social cohesion in the fraught area of religious and LGBT rights.	79,386.00	114,915.00	96,264.00	0.00	0.00	290,565.00	DEPARTMENT OF PREMIER AND CABINET, AUSTRALIAN GLBTIQ MULTICULTURAL COUNCIL INC., BRAVE NETWORK
	National Interest Test Statement Conflicts between religion, sexuality and gender identity have dominated Australian headlines since the passage of federal marriage equality legislation in 2017. This project addresses the issue of LGBT conversion therapy, which has been a key focus within the debate about the appropriate balancing of religious freedoms with protection of vulnerable people from institutional harms. Working in respectful partnership with religious and LGBT community groups, this research will produce a reliable evidence base regarding the scope, nature and impact of LGBT conversion therapy in Australia to better inform this debate, as well as policy and service responses to this issue. Research findings will support the production of resources to improve spiritual and mental health care for LGBT people and identify strategies for religious communities to work collaboratively with LGBT communities to progress mutual human rights objectives, resulting in significant social and cultural benefits to the Australian community.							
	La Trobe University	246,312.00	352,406.00	194,348.00	0.00	0.00	793,066.00	
Monash University								
LP190100267 Willoughby, Dr Louisa J	This project aims to improve the quality of interpreting/support services provided to deafblind Australians by analysing the communication strategies used by deafblind sign language users. Many deafblind people use a modified form of Auslan (Australian Sign Language) to communicate, yet little is known about how interpreters or support workers should adapt their signing when working with deafblind clients to ensure effective communication. This project would develop evidence-based training and resources for these professionals. This should provide significant benefits such as improved communication between deafblind clients and professionals, and enhancing the efficiency and effectiveness of support service provision for deafblind people.	86,366.00	107,090.00	86,541.00	0.00	0.00	279,997.00	ABLE AUSTRALIA SERVICES, NAATI
	National Interest Test Statement This Australian-first project partners with a deafblind service provider and the National Accreditation Authority for Translators and Interpreters to better understand the communication strategies used by deafblind sign language users. Currently sign language interpreters and support workers receive no specialist training for working with deafblind signers, despite deafblind signers having a unique way of signing/ communicating. The project lays the groundwork for professionalising this workforce. It will lead to myriad service improvements for deafblind clients. As such the project has social benefits in enhancing the quality of life of deafblind Australians and also economic benefits in enhancing the efficiency and effectiveness of support service provision. The National Disability Insurance Scheme (NDIS) has seen a surge in demand for deafblind support services. This project will contribute to alleviating the shortage of professionals competent and available to work with Deafblind clients, and through this to the social inclusion of deafblind people in Australian society more generally.							

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LP190100282 Smith, Dr Kathleen V	This project investigates the potential contribution of Problem Based Learning to school based Science, Technology, Engineering, Mathematics (STEM) education. The project expects to generate new knowledge about how the principles defining this PBL approach can support primary and secondary teachers to enhance learning opportunities and build STEM literacy. The project actively positions teachers as researchers interrogating their practice. Expected project outcomes include a pedagogical framework developed with teachers, and illustrations of practice capturing problem based learning in a range of school settings. Potential benefits include support for teachers, school leadership and sectors seeking to enhance STEM education.	133,937.00	125,996.00	162,159.00	0.00	0.00	422,092.00	CATHOLIC EDUCATION MELBOURNE, BRISBANE CATHOLIC EDUCATION
	National Interest Test Statement This project seeks to address the National STEM Strategy Report recommendation that Australian education systems provide all Australians with the capacity and confidence to make informed choices on complex matters where STEM offers options. Enhancing STEM literacy is essential as this is increasingly part of the core capabilities that Australian employers need. School based STEM education must enable students to identify, apply, and integrate concepts from STEM areas to understand complex problems and to innovate to solve them. Problem Based Learning, as evident in tertiary education, offers a potential approach to achieving such outcomes. By exploring how to best support teachers to use this approach in school based settings, this work potentially contributes to social development by advancing the personal growth and development of each student. The project also contributes to overall future national economic growth by developing a culture of innovation and productivity regardless of gender, occupation or industry.							
LP190100294 Suzuki, Prof Kiyonori	This project aims to clarify the mechanism of power losses in magnetic cores used in the petrol-electric hybrid cars by investigating the relationship between the core losses and magnetic correlation lengths in iron alloys. This project expects to generate new knowledge on the effect of magneto-mechanical interaction on the anomalous core loss in iron based alloys. The intended outcomes include an experimental confirmation of the random anisotropy model, a major theoretical model in nanostructured materials and identification of ideal magnetic domain configurations for lower power losses. These intended outcomes should bring great benefits to the development of low-carbon vehicle technologies for sustainable motorisation in Australia.	105,982.00	116,892.00	116,225.00	0.00	0.00	339,099.00	TOYOTA MOTOR CORPORATION (JAPAN)
	National Interest Test Statement More than ever, Australian society today is searching for technologies that could reduce the emission of carbon without sacrificing the quality of life. Since transportation is one of the main sources of carbon emission, alternative low-carbon vehicle technologies are vital to Australia. An effective approach is greater utilisation of the hybrid car technology which could improve fuel efficiency by 25 – 50 %. We will work with Toyota Motor Co in order to clarify the mechanism of power losses in magnetic cores in hybrid cars by using a neutron facility in New South Wales and thereby establishing a material design strategy to further enhance the efficiency of low-carbon cars. Toyota has been proactive in promoting renewably-powered vehicles in Australia through the Hydrogen Centre at their Altona plant. The proposed project is directly related to the magnetic components in hybrid and hydrogen-driven fuel cell technologies that would be transferred to Toyota Australia, the largest distributer of hybrid cars in Australian. Hence, this project potentially has an environmental benefit to the Australian community.							
LP190100337 Quinn, Dr John F	This project aims to provide a novel suite of degradable polymeric scaffolds for releasing multiple active agents with tailored release profiles by utilising both polymer and small molecule synthesis techniques. The project expects to generate new copolymers and polymer networks that exploit molecular architecture to regulate the release profile of the active agents incorporated. The expected outcome is the establishment of design criteria for tailoring the release of active agent from the polymer scaffold. This should provide significant benefits by developing a new technology platform that could be readily adapted to applications in agriculture, pharmaceutical science and veterinary medicine where controlled release is required.	279,670.00	287,691.00	143,946.00	0.00	0.00	711,307.00	POLYACTIVA PTY LTD

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	National Interest Test Statement The project involves a collaboration between researchers at the Monash Institute of Pharmaceutical Sciences and PolyActiva Pty Ltd, and will involve the development of next-generation polymers for releasing multiple active agents. Such materials are likely to have applications in pharmaceutical science, veterinary medicine and agriculture. In addition to addressing an immediate need for the partner organisation (i.e., the development of a new platform technology that could underpin future products for the company), the new intellectual property generated through the project could be used to spin off other companies in related but distinct fields. As such, the project has the potential to bring economic and commercial benefits to Australia. In the event that any new platform technology was developed, there would likely be new employment opportunities, thus creating jobs for graduates in science, technology and engineering. Moreover, the opportunity to partner with other larger commercial partners (both domestic and international) may lead to further investment in new Australian technologies.							
LP190100817 Abrahams, A/Prof Ralph	This project aims to develop a new cost-effective maintenance technique by applying laser cladding to enhance the characteristics of new rails and track components and repair damaged ones, so as to ensure their structural integrity and improve the performance of rail infrastructure. This project expects to generate new knowledge in the area of railway maintenance using the innovative and interdisciplinary laser cladding technology. Expected outcomes of this project are crucial for manufacturers and operators of railway networks to develop and improve their railway maintenance strategies. This should provide significant benefits, such as extending lives of rails and special track components, and reducing wheel squeal and flanging noise.	82,602.00	87,102.00	98,802.00	0.00	0.00	268,506.00	LASERBOND LIMITED, YARRA TRAMS, AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
	National Interest Test Statement The state and federal government has made railway infrastructure as a national priority for investment. This project focuses on developing laser cladding to enhance the performance of rails used in passenger networks in Australia. The outcomes will improve the structural integrity of rail infrastructure, which is critical due to the increasing demands on metropolitan rail systems. The outcomes of this research project will assist the development of an innovative rail maintenance technology by using laser cladding, which will not only help Australia's rail infrastructure owners to develop reliable and cost-effective rail maintenance strategy for existing rail tracks, but will directly bring significant economic benefits to Australia's rail infrastructure owners, through the reduction of maintenance costs and extension of asset life.							
LP190100841 Mills, Prof Catherine J	This project aims to investigate the social, ethical and regulatory issues arising with the rapid advancement and increased use of genomic non-invasive prenatal testing in early pregnancy in Australia. It expects to generate new insight into key issues such as consumer information before and after testing, consent, and equitable access to genomic health technologies in human reproduction. Expected outcomes include recommendations for addressing these issues, supported by ground-breaking social research and ethical and regulatory analysis. The project is expected to have major benefits, addressing the gap between policy and practice that has emerged in prenatal testing in Australia and shaping the ethics and regulation of pregnancy care.	150,000.00	175,000.00	150,000.00	0.00	0.00	475,000.00	VICTORIAN CLINICAL GENETICS SERVICES LIMITED, ILLUMINA AUSTRALIA PTY LTD
	National Interest Test Statement Non-invasive prenatal testing techniques are now widely used and can provide information about an extensive range of genetic conditions prior to birth. Yet the increasingly broad uptake of NIPT and the expanded range of the test raises significant and complex questions about policy and practice in prenatal screening. This project will address these through ethical and regulatory analysis, supported by extensive social research, to generate recommendations and guidance for providers at the forefront of non-invasive prenatal testing. Issues to be addressed include pre-test information provision and informed consent; what information is provided to consumers after testing; and equity of access to new genomic medical technologies. It is expected to produce outcomes that will benefit partner organisations, as well as have significant impact and benefit within the broader context of the integration of genomic technologies and precision medicine in Australia. This project has potential for significant social and economic benefits, improving pregnancy care and fostering trust in genomics in human reproduction.							

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LP190100917 Soria, Prof Julio	This project aims to untangle the fundamental principles that govern the fluid mechanics and particulate interactions in a novel concept chip-based micro-zero-net-mass-flux (micro-ZNMF) jet-assisted dry powder inhaler (DPI). Respiratory diseases affect 6.2 million Australians. The treatment of these diseases is hampered by the poor efficiency of current delivery systems, with conventional DPI devices exhibiting sub-optimum performance, delivering typically less than 20% of the loaded dose to the target site, the lungs. The new fundamental knowledge resulting from this research will enable the engineering of a high-efficiency groundbreaking DPI, with the potential to be fully adaptive user-specific benefiting millions of Australians.	246,676.00	257,950.00	247,740.00	0.00	0.00	752,366.00	CHIESI LIMITED
	National Interest Test Statement The financial burden on the Australian health care system for respiratory diseases is over $150 million dollars annually, with the respiratory medicine market predicted to be around US$21.9 billion worldwide by 2020. Technology, developed through this Linkage Grant, has significant economic potential for both the healthcare sectors and pharmaceutical industry, with discoveries being licensed and developed into commercial products in partnership. The partner organisation will utilise the novel micro-zero-net-mass-flux jet-assisted dry powder inhaler (DPI), but also other pharmaceutical local companies with collaborative links to the partner organisation in the development of other pharmaceuticals, could potentially make use of this smart approach for a DPI under license. The development of this new technology project fits extremely well with the Australian government's science and research priorities in health and advanced manufacturing and will ultimately be beneficial to both the healthcare system and to Australian industry, placing us at the forefront of research and development in this lucrative market.							
LP190100926 Stead, Prof Naomi	This project aims to examine the work and study cultures of architecture in Australia, in relation to professional identity, and in terms of impact on wellbeing, with a whole-of-career scope spanning education to retirement. It will generate the first comprehensive account of work-related wellbeing problems for both architectural practitioners and students, via qualitative and quantitative methods and a vigorous engagement with the profession. Expected outcomes include two toolkits to assist the profession to support cultural change across educational, workplace and institutional settings. This should provide significant benefits for the wellbeing of architects at all career stages, and also support the long-term viability of the sector.	92,417.00	94,476.00	105,261.00	0.00	0.00	292,154.00	NSW ARCHITECTS REGISTRATION BOARD, THE ASSOCIATION OF ARCHITECTURE SCHOOLS OF AUSTRALASIA, AUSTRALIAN INSTITUTE OF ARCHITECTS, ASSOCIATION OF CONSULTING ARCHITECTS AUSTRALIA, BVN ARCHITECTURE PTY LTD, SJB ARCHITECTS, FULCRUM AGENCY, THE TRUSTEE FOR THE ELENBERG FRASER INVESTMENT TRUST, HASSELL LTD, DESIGNINC LIMITED
	National Interest Test Statement The project will have economic, commercial, and social benefits. A productive, flourishing architectural workforce is crucial to the design and delivery of a quality built environment, which has major flow-on effects for public health and the economic prosperity of the whole Australian populace. But architects as a professional group are under intense pressure, with their productivity and wellbeing compromised by work-related pressures – beginning during their university training. National wellbeing is a stated concern of the Australian Government Science and Research Priorities, which emphasise the identification of emerging threats as well as strategies to improve and support wellbeing. Cognate professions such as law and medicine have well-developed research and support structures towards their constituents' wellbeing, but currently, architects have little such culture. This project promises social benefits to the architectural professional and student groups; commercial benefits for architecture practices through a more balanced, thriving workforce; and economic benefits to the built environment sector.							

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LP190100938 Duke, Dr Daniel J	This project aims to investigate the use of blended propellants to replace hydrofluorocarbons in technical aerosols. This project expects to generate new knowledge in the area of multiphase fluid mechanics and aerosol science through a combination of modeling, optical and synchrotron X-ray measurement techniques. Expected outcomes of this project include a capacity to develop environmentally friendly technical aerosol formulations which can match and potentially outperform currently available hydrofluorocarbon based products. This should provide significant benefits to the pharmaceutical industry through the generation of new knowledge regarding the fundamental physics of multicomponent sprays.	150,000.00	150,000.00	150,000.00	0.00	0.00	450,000.00	CHIESI LIMITED
	National Interest Test Statement This project seeks to address a major challenge in the use of sprays, to which Australia is highly exposed. The global phase down of hydrofluoroalkanes will have a detrimental effect on the cost and availability of medical inhalers for Australians. This is significant, as one in 6 Australian children rely on such products to manage their asthma. At present, there are no viable replacements for hydrofluoroalkanes in these products. This project aims to address this problem through the development of new knowledge regarding the fundamental multiphase fluid mechanics of blended propellant combinations. The dissemination of new knowledge regarding the physics of multicomponent aerosols will also bring flow-on benefits to other Australian industry sectors such as the agriculture and manufacturing, both of which rely on precision sprays.							
LP190101099 Lane, Dr Ruth	The project will advance understanding of reuse commodity chains, their societal benefits and contributions to a more sustainable circular economy. Drawing on case study research with charitable and community reuse organisations, factors facilitating or inhibiting reuse will be identified, and rigorous methods developed for assessing the benefits of reuse organisations in terms of quantities of materials processed, employment, skills development and contributions to regional economic development. Research outputs will provide a sound evidence base for government policy and decision-making and strengthen conceptual understanding of drivers and enablers of reuse and links with broader economic activities.	98,048.00	118,783.00	78,882.00	0.00	0.00	295,713.00	NATIONAL ASSOCIATION OF CHARITABLE RECYCLING ORGANISATIONS INC, SUSTAINABILITY VICTORIA, GREEN INDUSTRIES SA, DEPARTMENT OF ENVIRONMENT AND SCIENCE
	National Interest Test Statement The project will develop practical and rigorous methods for assessing the environmental, social and economic benefits of reuse facilitated by charitable and community sector organisations, that will allow inclusion of reuse activities in the National Waste Report, and in development of circular economy policy and reporting frameworks by state governments. It will provide a sound evidence base for government policy and investment decisions to promote socially inclusive sustainable development in line with UN Sustainable Development Goal 12: Sustainable Production and Consumption.							
LP190101230 Brugger, Prof Joel	This project aims to explore how the concepts of reaction-induced porosity and coupled dissolution-reprecipitation reactions, which have had a profound impact in geosciences, can be exploited in the context of ore processing through carbon sequestration. The project's main outcomes are to generate a new process that maintains porosity in ore, and a combination of lixiviants, for effective Cu metal recovery and Fe capture. This project will benefit the mineral industry by providing an alternative to the current paradigm in Copper mineral processing that requires the destruction of the mineral hosting economic value, thereby developing sustainable mining technologies well suited for the increasingly complex ores being extracted in Australia.	237,000.00	229,000.00	232,000.00	0.00	0.00	698,000.00	NEWCREST MINING LIMITED

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	National Interest Test Statement The mineral resources industry is Australia's largest export earner (40-50%), contributing ~8% of total GDP. However, the sector faces major challenges due to depletion of high-grade ore deposits, replaced by more complex, low-grade resources. In this context, exploiting chemically induced porosity to develop in-situ recovery technologies offers a step-change in enabling highly efficient and selective recovery of value metals from complex Cu-Au polymetallic ores; this also allows a significant reduction in generated waste rock as a by-product. Further, the process developed herein utilises a novel approach which incorporates the sequestration of carbon towards iron-entrapment and selective recovery of value Copper. Given the significant issues associated with climate change and Australia's commitment to meeting its climate targets, the new science of the present project allows for simultaneous sequestration of Carbon and selectively recovering value; this is a vital step change towards an environmentally sustainable, ultra-low-cost alternative to traditional hard-rock mining practices and strategies.							
LP190101250 Marriott, Prof Philip J	This project aims to evaluate and validate broad capabilities of advanced chemical profiling using benchtop and portable gas chromatography–mass spectrometry for forensic applications. Establishing guidelines for sampling various matrices, key performance measures, and improving chemical and residue identification for drug profiling in clandestine laboratories and public venues, chemical warfare agents, and chemical toxins is expected. Anticipated outcomes for project partners in defence and policing include detailed knowledge of sample and residue composition and on-site assessment of chemical risks with immediate feedback. Benefits should include improved community and security services safety by enhanced detection of harmful substances.	150,000.00	108,000.00	110,000.00	0.00	0.00	368,000.00	DEFENCE SCIENCE AND TECHNOLOGY GROUP, POLICE DEPARTMENT (VIC), PERKINELMER PTY LTD
	National Interest Test Statement Analysis of chemical weapons, drugs and toxins is often confounded by interfering matrices and low concentrations. New gas chromatography with mass spectrometry methods offer improved identification of these samples and their residues. This will provide evidence on identity, source, extent of use, and environmental hazards. Secondly, rapid onsite sampling of these chemicals enables immediate drug detection and risk assessment of chemical weapons in potentially hazardous situations, and permits rapid mitigation strategies to be implemented. This allows security services to protect their personnel and the public from harmful materials, ensuring greater protection for the Australian community.							
LP190101290 Rossjohn, Prof Jamie	T cells play a key role in the adaptive immune system, whose reactivity must be controlled to prevent aberrant reactivity. Central to the function of T cells is the T cell antigen receptor, and a host of co-stimulatory molecules, co-receptors and inhibitory receptors. This proposal, in partnership with Immutep Ltd, aims to gain a basic understanding of the structure and function of a key inhibitory receptor found on T cells, termed the Lymphocyte activation gene-3 (LAG-3). The proposal utilises a combination of cellular immunology and structural biology to gain insight into the form and function of the LAG-3 molecule. Ultimately this fundamental knowledge can be used by the biotechnology industry.	217,467.00	223,810.00	230,150.00	0.00	0.00	671,427.00	IMMUTEP LIMITED
	National Interest Test Statement This project will develop a deep understanding of the structure and function of a protein found on the surface of immune cells. The protein (called LAG-3), is part of an immune control pathway and understanding its basic structure will enable future drug development, particularly for immunotherapies that target this pathway. Partnering with ASX-listed biotech company Immutep Limited will speed creation of valuable new intellectual property, and generate new biotechnology product pipelines to benefit Australians.							
	Monash University	2,030,165.00	2,081,790.00	1,911,706.00	0.00	0.00	6,023,661.00	

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RMIT University								
LP190100114 Moore, Prof Robert J	The aim of the project is to develop a vaccine to reduce Campylobacter bacteria in chickens. Campylobacters cause disease in both poultry and humans. Poultry products are the most common source of human infections. By reducing Campylobacter in poultry, the transfer to humans will be reduced. The expected outcomes arising from this work will be a reduction of the economic burden of poultry losses, in an Australian industry valued at $2.8 billion/year, and an improvement in food safety, thus helping to reduce the burden of foodborne illness, estimated to be $1.2 billion dollars/year. This project is, therefore, poised to benefit the Australian economy, specifically primary producers and the general public, by targeted vaccination of poultry.	218,000.00	269,000.00	283,000.00	219,000.00	0.00	989,000.00	LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, UK, BIOPROPERTIES PTY. LTD.
	National Interest Test Statement Food safety & biosecurity are key concerns facing the poultry industry and are among Australia's National Science and Research Priorities. Reduction of foodborne illness caused by Campylobacter and Salmonella was identified as a priority area by the Australia and NZ Ministerial Forum on Food Regulation (2017-21), who highlighted the need for food supply chain solutions and industry engagement to develop interventions. The Australian Chicken Meat Federation and Australian Eggs recognise Salmonella and Campylobacter as the most important bacteria for food safety, consumer confidence and bird health. Modelling has predicted that a 100-fold reduction in Campylobacter levels in chicken carcasses would reduce the risk of campylobacteriosis in humans by 30-fold. There is currently no commercial vaccine against Campylobacter available for use in poultry. Our novel approach targets campylobacters and Salmonella simultaneously, without reliance on antibiotics, to deliver economic benefits to the poultry and health industries; commercial benefits to the biotechnology industry; and environmental benefits to the nation.							
LP190100165 Bab-Hadiashar, Prof Alireza	Lightweighting in the car industry by the use of aluminium reduces emissions substantially. It entails joining the car body sections by self-piercing rivets rather than the traditional spot welds. We aim to fill the technology gap for effective quality control of these joints. The project expects to solve the problem by merging industry 4.0 principles, three-dimensional X-ray technology, machine learning computer vision and structural mechanics. The expected outcomes are technologies for automation-friendly assessment of these joints. This should benefit industries from medical to electronics to automatically spot a random and delicate abnormality within a solid of complex geometry, such as that in live tissue or an electronic circuit.	93,244.00	94,000.00	93,961.00	0.00	0.00	281,205.00	FORD MOTOR COMPANY OF AUSTRALIA LIMITED
	National Interest Test Statement Use of Self-Piercing Rivets (SPR) enables joining of aluminium in car bodies. This sustainable engineering practice has a double bottom-line impact: environment and economy. As a strategy, it leads to substantial reductions in energy usage and emissions throughout the life cycle of the structure in areas such as material, manufacture, transport, usage, disposal and end of life credit. This project creates the missing technology for effective quality control of these joints for the project industry partner (Ford) who is investing heavily in vehicle design engineering in Australia. The technology resulting from this project is a catalyst for lightweighting of transport vehicles. Since this project fills the gap for an effective quality control technology of SPR joints compatible with the automotive industry, it is an enabler for the commercialisation of lightweight transport vehicles. Thanks to SPR joint's non-permanent nature, the strategy allows an easy replacement of a faulty part in the complex structure during the repair/maintenance which has significant beneficial impacts for environment and economy.							
LP190100453 Bekessy, Prof Sarah A	Consumption of resources is the major driver of biodiversity loss yet understanding of how to change behavioural drivers is lacking. This project aims to understand barriers to biodiversity behaviours across a supply chain, how to overcome them and increase positive biodiversity impact via spillover effects. We will use coffee as a case study to test specific interventions, design effective message frames for reducing the psychological distance of consumption behaviours and develop a framework for generalising to other behaviours impacting biodiversity. The project is expected to generate new knowledge and approaches critical for policy makers and other actors seeking to reduce consumptive impacts on biodiversity.	129,419.00	102,685.00	140,439.00	0.00	0.00	372,543.00	ZOOS VICTORIA, A. GENOVESE & SONS PTY. LTD., SMITHSONIAN NATIONAL ZOOLOGICAL PARK

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	National Interest Test Statement							
	Australians care about biodiversity and want to act to protect it, but the pathways for doing so are not clear. This project uses coffee as a case study to examine behaviours that could benefit biodiversity across an entire supply chain and understand structural and psychological barriers to their uptake. Our partners, along with many other organisations, will benefit from more effective behaviour change programs (PO Zoos Victoria), improved certification (PO Smithsonian) and market opportunities for biodiversity friendly products (PO Genovese). Outcomes of the project will also benefit state and Federal governments in designing policy to encourage people to connect with and act for nature and in seeking to contribute to international priorities such as the Sustainable Development Goals. More broadly, the project will benefit the community by offering an opportunity to engage in a frequent behaviour that benefits biodiversity and in doing so consider the impacts their other behaviours have on biodiversity, both here in Australia and abroad.							
LP190100728 Khoshmanesh, Dr Khashayar	This project aims to create technology platforms, utilising microfluidics and machine learning, to study the fundamental biological processes underlying the accumulation of immune cells underneath the vessel wall, which is known as foam cell formation. This project expects to deliver technologies, which facilitate mimicking and analysis of the complex dynamics of the human vessels in a more accurate, time- and cost-effective manner. The expected outcome will be cutting-edge tools and techniques to better understand the fundamental biological mechanisms driving foam cell formation. This should facilitate the development of future cardiovascular drug discovery technologies, which would benefit the biotechnology and pharmaceutical industries.	140,000.00	145,000.00	145,000.00	0.00	0.00	430,000.00	LEADING TECHNOLOGY GROUP PTY. LTD., BAKER IDI HEART AND DIABETES INSTITUTE
	National Interest Test Statement							
	This project aims to combine the latest advances in microfabrication technologies and machine learning data analysis techniques to better understand the fundamental biological mechanisms driving the deterioration of the vessels due to the undesired accumulation of immune cells underneath the vessel wall, which is known as foam cell formation. It provides technology platforms to mimic, acquire and analyse complex cellular responses in artificial, bio-mimicked vessels. These technologies facilitate cellular assays, drug discovery and personalised medicine, and thus offer huge potential for commercialisation. These technologies can be licensed and produced in Australia, creating new job opportunities in the biotechnology industries. These technologies reduce the time and costs associated with developing new drugs, and thus facilitate the growth of local pharmaceutical industries.							
LP190100991 Li, Prof Xiaodong	This project aims to develop effective techniques to identify the sources of fuel losses, such as leaks and calibration errors in underground storage tanks at service stations. Monitoring fuel losses at service stations is influenced by many external factors which can be difficult to predict. The project expects to use machine learning to develop the techniques and test them with live data at service stations. The expected outcomes are a set of tailor-made machine learning techniques for effective fuel loss detection and a software suite that can be easily incorporated into the normal operation of service stations. This should reduce the costs to the petroleum industry from wasteful leaks and the environmental damage caused by these leaks.	105,000.00	105,000.00	105,000.00	0.00	0.00	315,000.00	ENVIRONMENTAL MONITORING SOLUTIONS PTY. LTD.
	National Interest Test Statement							
	Fuel losses such as leakage from underground fuel storage systems is a common problem in Australia. It causes significant contamination of soil and groundwater, with the resulting health implications, and leads to site contamination that requires costly remediation. Techniques to provide early and accurate detection of fuel losses are urgently needed. Current statistical tools employed to monitor fuel losses are based on conventional statistical methods and have serious limitations in practical use, being manual, labour-intensive and slow. This project will develop innovative and effective machine learning methods to overcome these limitations, that will allow current fuel loss monitoring software to accurately identify and quantify unacceptable losses, evaporative losses and losses through incorrectly calibrated equipment. This system will benefit the Australian petroleum industry by reducing costs incurred by wasteful leaks and assist it in meeting Australia's health, safety and environmental regulations.							

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LP190101046 Bryant, Prof Gary J	The aim of this project is to characterise human blood platelet deterioration during cold storage and cryopreservation, and accelerate the development of improved long-term storage options. The project expects to generate important new knowledge about how platelets deteriorate during storage, and how such deterioration can be minimized. The expected outcomes are improved methods for long term platelet storage. This should benefit blood donation services and hospitals by improving platelet delivery to remote locations, reducing wasted blood and the number of donations required, leading to significant financial savings. **National Interest Test Statement** The cost of producing platelets in Australia is approximately $68 million per annum (~150,000 units). Due to their short shelf life of 5-7 days, many units are wasted, with a cost of ~$7.5 million per annum. The development of a method of long term platelet storage would dramatically cut wastage and the costs of these vital services. This would not only reduce wastage and financial losses, but would also reduce unnecessary donations from the public. Moreover, long term storage would provide a solution for remote, rural and military settings, which currently have significant delays in platelet delivery or no access to this resource. In addition Australia's research capacity will benefit from having early career researchers and students trained in a highly interdisciplinary research team on an important real world problem.	123,891.00	127,470.00	131,544.00	0.00	0.00	382,905.00	AUSTRALIAN RED CROSS BLOOD SERVICE
LP190101294 Wang, Prof Lijing	This project aims to improve multilayered firefighting protective garments and their thermal comfort by utilizing aerogel microparticles containing thermal regulation materials and flame-retardant agents. This research will create new multifunctional fabric designs and engineering techniques to integrate improved heat and flame protection, comfort and smart features into optimized multilayered garments. It will create novel clothing systems that will better protect wearers and allow them to effectively combat bushfires and save lives and assets. The successful completion will enable industrial capability in next generation advanced protective garments and functional uniforms for broad occupational health safety and well-being applications. **National Interest Test Statement** This project will provide substantial societal benefit to the Australian community by developing next generation protective clothing systems with improved performance and comfort to protect those who risk their lives to save properties and other people's lives. The clothing systems could also be lifesaving personal protective equipment for civilians in bushfire prone areas or flash fire environment. The study will contribute to occupational health and community safety, and industrial capability development. The innovative material design and engineering technology developed through the project and the world-class researchers trained will be the foundation for Australian textile industry to advance its supply chain competitiveness and capture the fast growing business of protective clothing. The technologies and material engineering methods will enable Australian industry to access multibillion-dollar markets for multilayer protective garments with enabled sensors and other electronics in a manner that is sufficiently durable, reliable and ergonomic for the demanding eTextiles applications.	142,360.00	146,440.00	150,514.00	0.00	0.00	439,314.00	HUNTING LADY PTY. LTD.
	RMIT University	951,914.00	989,595.00	1,049,458.00	219,000.00	0.00	3,209,967.00	

The University of Melbourne

LP190100424 Gilkerson, Prof James R	Antimicrobial resistance threatens Australians' health, Australia's animal health and its reputation for providing safe and reliable food. Overuse of antimicrobials is a driver of antimicrobial resistance. This project aims to address the overuse of antimicrobials in animals by implementing antimicrobial stewardship in veterinary practices and developing methods of antimicrobial use surveillance. It is the first comprehensive study to address and assess inappropriate use of antimicrobials in veterinary medicine- and is expected to improve quality use of antimicrobials by veterinarians and prolong the efficacy of antimicrobials in veterinary medicine. This presents a critical step in reducing community exposure to antimicrobial resistance.	67,435.00	126,666.00	90,817.00	0.00	0.00	284,918.00	BAYER AUSTRALIA LTD, ZOETIS AUSTRALIA PTY LTD

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	National Interest Test Statement Antimicrobial resistance is predicted to kill 10,000,000 people globally each year and cost the global economy $140 trillion annually by 2050- representing a pronounced economic and social threat to the Australian community. According to Animal Medicines Australia, 62% of Australian households have a pet and research has shown that antimicrobial resistance in companion animals, housed in the family environment, poses a risk to in-contact persons. Inappropriate antimicrobial use accelerates the development of antimicrobial resistance. This project will improve antimicrobial use by veterinarians and thereby improve prevention and management of antimicrobial resistance in animals and people. This will reduce the risk of the emergence of resistance in companion animals and therefore exposure of animal owners to resistance. In addition, the results of the project can guide nationwide implementation of veterinary antimicrobial stewardship programs, as is required by the Australian Government's National Action Plan (2015) to tackle antimicrobial resistant infections.							
LP190100528 Prawer, Prof Steven	Diamond materials are ideal for quantum technologies and are leading the charge in the new wave of real-world quantum industries. The aim of this project is to develop a reliable source of quantum-active diamond membranes to enable the development of new industries. This would be significant for technologies including quantum telecommunication, medical imaging and nano-scale quantum sensing. Of particular interest, expected outcomes include the development of materials for advanced medical imaging technologies. Successful development in any of these industries has the potential to greatly benefit society through improved healthcare, the development of new high-tech industries and advanced secure computing.	138,617.00	115,000.00	115,000.00	0.00	0.00	368,617.00	THE ISRAELI CENTER OF ADVANCED DIAMOND TECHNOLOGIES
	National Interest Test Statement The research aims to enable the growth of nascent quantum industries in Australia through linkage to existing international companies. This would be achieved by providing the right quantum-enabled diamond materials for each application, enabling a growing list of quantum-based technology proposals. Successful developments would provide economic opportunities through the development of new high-tech (quantum) industries, such as quantum communication, quantum computation (through quantum repeater networks) and quantum sensing. There is also significant opportunity for increases in social well-being through new medical imaging technologies, for example through quantum enhancement of contrast agents in MRI imaging. Finally the research would help train the next generation of materials scientists and quantum engineers for future advanced manufacturing industries in Australia.							
LP190100623 Craig, Prof Jocelyn (Lyn) P	This project aims to investigate the economic, social and emotional impacts of precarious work on women. Focusing on the challenges that arise from juggling precarious work with care responsibilities and/or demands from the social support system, the project identifies the strategies women have to manage these demands, and the impacts these demands have on everyday lives across different life stages. By combining otherwise separate bodies of literature with innovative quantitative and qualitative data, the project seeks to generate new knowledge about the impacts of precarious work on women and families. This knowledge is expected to inform policies and services to improve women's lives and promote economic inclusion and social cohesion.	51,192.00	156,556.00	131,586.00	0.00	0.00	339,334.00	GOOD SHEPHERD AUSTRALIA NEW ZEALAND, AUSTRALIAN INSTITUTE OF FAMILY STUDIES, VICTORIAN WOMEN'S TRUST LIMITED
	National Interest Test Statement This project contributes new knowledge that can help alleviate and prevent negative impacts of the rise of new forms of work in Australia. Through an explicit focus on women the project addresses issues that are critical to not only labour market policies, but also family and social policies. While increasing women's labour market participation is a national priority and carries great opportunities for women, the rise of precarious forms of work presents specific challenges especially to those with care responsibilities. Identifying which strategies and resources these women draw on in their day-to-day lives to 'make it work' when juggling precarious work, care responsibilities and/or demands from the social support system can inform policies to better underpin such strategies. At the same time, shedding light on the economic, social and emotional impacts of this juggling will provide new knowledge enabling service providers and NGOs who support women in precarious positions to better tailor their activities. The partnership with key organisations ensures that project findings will reach diverse audiences.							

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LP190100631 Johnson, A/Prof Alexander A	This project aims to generate bread containing high amounts of biologically available iron through targeted manipulation of plant-derived phytonutrients at several points along the wheat-to-bread supply chain. The project expects to generate new knowledge for developing healthier bread and address consumer demands for value-added food products. Anticipated outcomes are novel plant breeding and food manufacturing techniques that enhance the nutritional composition of wheat grain and bread making products, resulting in higher-value agricultural commodities and breads. The project should benefit bread retailers and crop growers involved in Australia's $4.7 billion bread market and reduce the environmental impacts of bread production. **National Interest Test Statement** Approximately 11 million Australian grocery buyers purchase bread each week and spend on average $90 million between them. Supermarkets currently account for two-thirds of the bread market while one-third is split between specialty bread shops, milk bars and other stores. Intense competition in the industry requires continuous innovation by bread-making businesses to meet evolving consumer preferences for quality and to anticipate emerging trends. Bread is currently experiencing a surge in popularity thanks to new bread options conferring nutrition and wellness benefits such as low glycemic index, high protein and low fermentable oligosaccharides, disaccharides, monosaccharides and polyols (Low FODMAP). This research focuses on increasing the fraction of bread iron that can be stored or utilized for physiological function in the human body (i.e. bioavailable iron). Iron deficiency is the most common nutritional deficiency in Australia and affects over one million people, primarily young women and children. Strong interest in iron bioavailable bread is expected in national and international bread markets.	144,231.00	175,809.00	182,156.00	208,578.00	150,000.00	860,774.00	USDA - AGRICULTURAL RESEARCH SERVICE, USA, LIVING FARM PTY LTD, BAKERS DELIGHT HOLDINGS LTD.
LP190100686 Lewis, Prof Jennifer M	This project aims to analyse the implementation of a 'digital first' employment services system, its effects on frontline services and governance, and its potential for policy learning. It expects to generate new knowledge on how digitalisation changes interactions between jobseekers, providers, employers and the government, by working with our industry partners in a collaborative innovation lab. Expected outcomes of this project include a theoretically informed, and practically tested, model of how digitalisation can promote service design and policy innovation that benefits jobseekers and employers. This should provide significant benefits for welfare system design, service outcomes, and policy learning nationally and internationally. **National Interest Test Statement** This project will make a significant contribution to maximising social and economic participation. Australia's publicly-funded employment services system is highly regarded internationally for its efficiency, but the system has struggled to provide effective support to disadvantaged jobseekers with complex needs. Levels of employer engagement with job services are also very low. This research will identify the many ways in which digitalisation is likely to affect the targeting of support to jobseekers, as well as employers, in Australia. It will draw on insights from international experience to advance our understanding of how policy learning can be incorporated into Australia's future system, providing potential benefits for governments, welfare service providers, employers, and disadvantaged jobseekers. It will also produce much needed information on how more Australians might be better assisted into greater social and economic participation through these services. The project's findings on how governance and service design can best support jobseekers, will also suggest how policy might be improved.	57,471.00	107,449.00	95,396.00	103,796.00	0.00	364,112.00	NATIONAL EMPLOYMENT SERVICES ASSOCIATION LIMITED, WCIG TRAINING SERVICES
LP190100921 Goldfeld, Prof Sharon R	The project aims to use cutting edge analytic approaches applied to existing data to identify how policy interventions related to parents' mental health, preschool programs, and the built environment can be optimised to reduce inequities in children's mental, academic, and physical health outcomes. The project will be informed by our partners and advisers from across government portfolios and service delivery, ensuring that the evidence generated has contemporary policy relevance. The project expects to identify clear and actionable policy pathways to reduce child inequities in Australia, which can benefit decision makers by helping them to direct limited public funds towards intervention opportunities that will have the greatest impact.	158,561.00	152,729.00	163,724.00	0.00	0.00	475,014.00	BEYOND BLUE AUSTRALIA PTY LTD, VICTORIAN HEALTH PROMOTION FOUNDATION, MURDOCH CHILDRENS RESEARCH INSTITUTE, BROTHERHOOD OF ST LAURENCE, COMMONWEALTH DEPARTMENT OF HEALTH, DEPARTMENT OF SOCIAL SERVICES

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	National Interest Test Statement							
	Inequities in children's health and development refer to differential outcomes that are unjust and preventable, and are driven by the circumstances in which children live, learn, and develop. This project aims to generate evidence that can inform the development of more effective and precise policies to reducing child inequities, particularly those relating to children's mental, academic and physical development. The potential benefits of reducing child inequities through existing policy mechanisms are significant. Estimates from Australia suggest that eliminating child inequities could achieve a 70% reduction in poor cognitive, physical and social-emotional outcomes, with international studies suggesting a potential 20% contribution to GDP growth over the next 60 years. Addressing child inequities could therefore generate substantial savings in health, education and welfare budgets, as well as raise the productivity of society at large.							
LP190100940 Dressler, Dr Wolfram H	This study examines the origins and impacts of the rapidly emerging edible birds' nests (EBN) trade for rural livelihoods and ecologies in Southeast Asia. A high-value Chinese delicacy, the EBN trade has surged across rural Indonesia and beyond. In partnership with the WWF and Tropenbos, our pioneering study investigates how rural producers negotiate the uneven social, economic and environmental influences of the EBN commodity chain in the threatened Heart of Borneo, Indonesia, and the major urban trading centres of Jakarta, Singapore, and Hong Kong. The project offers novel insights into the trade's sustainability across rural and urban regions of Asia and informs policy for poverty reduction and environmental management in the region.	54,810.00	51,423.00	53,610.00	0.00	0.00	159,843.00	WORLD WILDLIFE FUND INDONESIA, TROPENBOS INDONESIA
	National Interest Test Statement							
	Across both rural and urban Indonesia, the production and trade of edible birds' nests (EBN) represents an increasingly lucrative economic activity. Linked to booming culinary and pharmaceutical demand from middle- and upper-class consumers across Asia, commercial EBNs are now a $1.6 billion industry, with Indonesia holding an 80% share. As Australia's closest, most populous neighbour, Indonesia's intensifying EBN trade introduces new agrarian opportunities and challenges—from poverty reduction, migration and financial flows—that impact food supply chains in, and remittances flows to, major Australian cities with unknown social, economic and environmental impacts. Our study enhances knowledge and policy design on the EBN regulatory regime and transnational connections between Indonesia and Australia, and overall outcomes for livelihood security, environmental sustainability and Australian donor aid in the region. To communicate results, we develop stakeholder workshops, policy briefs and social media tools targeting government, civil society, traders, and farmers.							
LP190101134 Hutchins, Prof Nicholas	Partnering with AkzoNobel, one of the world's leading suppliers of anti-fouling marine coatings, this project will deliver new tools for predicting the drag penalty on ships fouled by the settlement of marine organisms on the hull. All available predictions assume a homogeneous distribution of roughness. Yet we know biofouling is always patchy, hence prediction methods need an upgrade. Making a compelling business case to ship operators is contingent on such predictions, where the cost of anti-fouling solutions is weighed against that of continued operation with a rough hull. The novel tools developed here will therefore lead to increased ship efficiency by empowering ship operators to optimise hull cleaning and repainting schedules.	55,000.00	55,000.00	55,000.00	0.00	0.00	165,000.00	AKZONOBEL
	National Interest Test Statement							
	Australia is unusually reliant on long-haul transportation with shipping contributing substantially to Australia's energy usage. Most fuel consumed by a ship is expended to overcome drag, which increases greatly when ship hulls are roughened due to biofouling. Globally, this performance penalty is estimated to cost $10 bn p.a. Additionally, government commits over $50m p.a. to address biosecurity risks. Invasive species harbored by international ships is a known serious risk that is not easily mitigated without significant cost to ship operators. The voluntary decision to clean a ship is based on economic impact and these decisions are hampered by a lack of information on hull surface condition and the resulting drag penalty. Partnering with AkzoNobel, a supplier of marine anti-fouling coatings, this project will exploit state-of-the-art experiments, fundamental insights and industry data, to develop tools to accurately predict the drag penalty for patchy (heterogeneous) hull roughness. This will allow ship operators to reduce fuel costs and assist regulatory bodies in improving international regulation.							

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LP190101189 Ruppanner, A/Prof Leah E	This project aims to investigate the chronic under representation of women in Australian politics through a local government lens. It expects to generate new knowledge about barriers to female political representation, their political performance and pathways to higher tiers of elected office. By following men and women councillors across an election cycle, this research seeks to robustly compare and measure women's experiences of local politics to develop a new framework to map and address obstacles preventing political equity. Expected outcomes include theoretical advances and a 'best practice' guide for achieving parity.This should provide significant public benefits by advancing female participation across all levels of governments.	55,015.00	61,000.00	50,000.00	60,995.00	0.00	227,010.00	VICTORIAN LOCAL GOVERNANCE ASSOCIATION (VLGA)
	National Interest Test Statement This project directly aligns with Australia's national interest priority to develop healthy communities, thus providing social, cultural and economic benefits. Female politicians are more likely to support policies for families, education and healthcare and are more conservative in their spending, mandating fiscal responsibility over budget deficits. Yet, Australia lags behind many OECD countries in its female representation and which has declined dramatically since 1999. Local governments are an important entry point for women into higher political offices. Local government officials hold less power, are more rural and garner less media attention and thus are overlooked as an important area of study. This project will be the first to comprehensively investigate women's experiences representing local governments to develop key strategies for local governments to support female representatives and for state and federal governments to strengthen their pipelines.							
LP190101209 Gasser, Prof Robin	This project aims to establish an advanced, industry-linked pipeline for the development of new drugs against resilient infectious agents (parasites) that cause serious diseases in billions of animals worldwide. The research expects to discover new ways of killing parasites that survive in their host animal, despite being under severe attack by the host immune system. The resultant shift in fundamental understanding will lead to innovative technologies or products to ameliorate the burden of parasites in livestock animals. Expected socioeconomic benefits include commercial products for end-users and lifting Australia’s scientific knowledge base, reputation in biotechnology, livestock production and investment in translational research.	238,780.00	256,700.00	255,780.00	0.00	0.00	751,260.00	PHYLUMTECH
	National Interest Test Statement Parasitic diseases of animals cause economic losses of tens of millions of dollars annually to farmers and the livestock industries in this country alone, and hundreds of millions of dollars worldwide. The benefits and impact of this project to Australia include creating a new scientific knowledge-base about parasitic diseases for biotechnological translation; capturing IP to develop commercial products (new treatments and vaccines) of major relevance to industry and end-users; increasing the profitability of livestock animal production; reducing drug resistance risk and improving the sustainability of agriculture, particularly in regional and rural communities; and increasing the quality and number of highly skilled life scientists, and providing them with unique employment opportunities.							
LP190101287 Alpcan, Prof Tansu	This project aims to develop software-defined and cognitive radio networks (SDR) to detect adversarial communications and achieve situation awareness on radio frequency (RF) spectrum. The project will generate novel SDR architectures and new attack-resistant detection algorithms through innovative approaches combining machine learning and game theory. Expected outcomes include a strategic alliance between the University of Melbourne and the Northrop Grumman Corporation. Among significant benefits, the project will improve cybersecurity of RF spectrum as a national asset, help protect critical infrastructure relying on wireless networks such as telecommunications and defence, and build skills in cybersecurity and Artificial Intelligence.	105,000.00	110,000.00	110,000.00	0.00	0.00	325,000.00	NORTHROP GRUMMAN

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(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)
	National Interest Test Statement							
	The project will create a strategic alliance between the University of Melbourne and the leading global security company Northrop Grumman Corporation (NGC), which aims to increase access to university research with an emphasis on developing R&D partnerships with Australia. Collaboration with NGC will provide direct benefits to Australian defence and communications sectors through novel products and solutions. The machine learning research undertaken at the host organisation in Australia will contribute to local know-how and train multiple Australian researchers within the strategically important field of Artificial Intelligence (AI). High quality research results will be openly published in conferences and journals. Research outcomes will play an important role in securing AI methods and wireless networks such as 5G, which will be widely used in the future, against adversarial attacks. Hence, the project contributes significantly to the cybersecurity priority area. Situation awareness in radio spectrum will help protecting a number of critical infrastructure and industry sectors.							
	The University of Melbourne	1,126,112.00	1,368,332.00	1,303,069.00	373,369.00	150,000.00	4,320,882.00	
	Victoria	4,523,483.00	4,896,679.00	4,565,305.00	592,369.00	150,000.00	14,727,836.00	

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Western Australia								
The University of Western Australia								
LP190100346 Wernberg, A/Prof Thomas	This proposal aims to progress a novel marine restoration technique (green gravel) from concept to application. This is significant because it will overcome key challenges currently hindering success of kelp forest restoration and provide scalable and practical solutions to future-proof kelp forests against climate and anthropogenic stress. Outcomes include progression of marine restoration from science to practice and into policy through local and global communication. Benefits include strong local and global alliances to scale up kelp restoration and reverse habitat degradation and associated economic loss.	114,860.00	95,344.00	95,344.00	0.00	0.00	305,548.00	DEPARTMENT OF PRIMARY INDUSTRIES - NSW, SEAFORESTER
	National Interest Test Statement Kelp forests are among the most ecologically and socio-economically important marine habitats covering over ~71,000 km2 of the Australian coast, yet are rapidly declining with the value of economic loss estimated at ~ $1,000,000 per km of coastline per year. This research will overcome extant challenges hindering restoration of kelp forests by pioneering new techniques that will allow large scale, practical and cost-effective revival of these declining forests. These novel techniques will allow a broad range of user groups to reverse kelp loss and restore the biodiversity and economic values they underpin. Moreover, this research falls within the Australian government priority areas of environmental change by providing new options for responding, adapting and mitigating habitat loss. It firmly aligns with the National Marine Science Plan and will significantly build national research capacity.							
LP190100433 Jiang, Dr Haibo	Short RNA and DNA molecules represent a class of macromolecules that have great potential, but to facilitate their trafficking across cellular and membrane barriers into specific sites of action is challenging. This project aims to develop and apply novel imaging approaches to track them in cells and tissues. Expected outcomes include better understanding of the trafficking across cellular and membrane barriers, and improved imaging tools that could be used to further study the molecular mechanisms of accumulation, metabolism and trafficking of these molecules. This project should provide new strategies to target these molecules to specific cells and tissues, which have significant social and economic benefits to the Australian community.	190,400.00	183,500.00	184,500.00	0.00	0.00	558,400.00	IONIS PHARMACEUTICALS, UNIVERSITY OF CALIFORNIA, LOS ANGELES
	National Interest Test Statement The project is expected to fundamentally improve our understanding of the trafficking of short RNA and DNA molecules in cells and tissues, which is a key question in the RNA-targeting pharmaceutical industry. The new knowledge and innovative imaging technology generated in our project could lead to new scientific directions. This project will lay the foundation for the potential long-term strategic research alliances with industry end-users. The cutting-edge and high-profile research is expected to expand Australia's capabilities in RNA-targeted macromolecules and advanced biological imaging, which are research areas of increasing national and international importance. This project has the potential to lead to significant downstream applications in designing new chemistry for therapeutics to direct the trafficking of these molecules across cellular and membrane barriers into specific sites of action, which has enormous economic and social benefits to the Australian community.							
LP190100558 Hooper, Dr Paula L	This project will directly engage with the community through the development of an innovative public participatory mapping tool ("Map My Say") to evaluate community experiences of infill development and to identify the determinants of community support for, or resistance to, densification in urban development sites correlated with public transport. The findings of the project will support future planning and land use decisions related to creating resilient urban environments and provide decision planning tools to support appropriate solutions for urban communities. Working with our industry partners the findings will be used to directly inform the planning and design of future Metronet station precincts in Western Australia.	160,000.00	160,000.00	160,000.00	0.00	0.00	480,000.00	LANDCORP WA, DEPARTMENT OF COMMUNITIES, GAIA RESOURCES, WESTERN AUSTRALIAN PLANNING COMMISSION

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	National Interest Test Statement Australia is one of the world's most urbanised countries with 89% of Australians living in urban areas. Nonetheless, Australian cities are struggling to meet their urban infill targets and the resulting urban sprawl is unhealthy, costly, unsustainable and unproductive. One of the reasons that Australian cities are not achieving there urban infill targets is because of a public antipathy and resistance regarding densification – a wicked problem this proposed project will directly engage with through innovative public participatory mapping tool. The results of this project will be Transit-Oriented Development which is reconciled with community sentiment, yet at the same time delivers greater environmental sustainability, improved health and wellbeing outcomes and stimulates economic growth.							
LP190100724 McDonald, Prof Jo M	The Dampier Archipelago is on Australia's National Heritage List because of its significant rock art and stone features. Known as Murujuga to its traditional custodians, this land- and seascape has over 1 million art works. While the scientific and cultural significance of this area is acknowledged, we still know little about the age of this landscape, the regional palaeoclimatology, and the timing and intensity of rock art production since Aboriginal people moved into this region 50,000 years ago. This project will develop new scientific approaches to direct-dating engravings and stone features, reconstruct climate from geological proxies, and model voyaging opportunities as this unique cultural estate transformed to an archipelago.	260,755.00	266,985.00	286,590.00	288,200.00	235,370.00	1,337,900.00	MURUJUGA ABORIGINAL CORPORATION, RIO TINTO LIMITED, WOODSIDE PETROLEUM LTD.
	National Interest Test Statement This project aims to produce data of national scientific and social significance that will assist our understanding of the nature of Aboriginal settlement in northwestern Australia and the role that rock art played in this process. This project aims to cement Australia as a world leader in rock art analysis and dating and thus will have cultural and scientific benefits to the nation. This project will consolidate a long-term strategic alliance between Aboriginal Traditional Owners and their Ranger groups, researchers and Industry. This collaborative partnership will greatly enhance and improve the promotion, conservation and management of cultural heritage in Western Australia, thereby achieving long lasting national economic, environmental and social benefits.							
LP190100785 Fiorentini, A/Prof Marco	The project will provide a new set of tools to explore for gold-rich ore deposits in Australia and globally. By integrating geochemical studies with cutting-edge experiments carried out at three Australian universities in strategic partnership with industry, the outcomes of this project will provide much needed knowledge to predict the locations of large gold-rich deposits that are concealed beneath vast expanses of the Australian continent. The new results will translate into smarter exploration practice, significantly enhancing success in targeting ore deposits that are rich in high-value metal and display the smallest have a small environmental footprint, to underpin the sustainability of our nation into the future.	177,397.00	168,397.00	173,897.00	0.00	0.00	519,691.00	RIO TINTO LIMITED, NEWMONT MINING CORPORATION, ANGLO AMERICAN, ANGLOGOLD ASHANTI AUSTRALIA LIMITED
	National Interest Test Statement As one of the world’s leading producers, gold mining contributes substantially to gross economic output in Australia. Most types of gold-rich ore deposits were formed by hot aqueous fluids released by crystallising magmas. We have discovered a suite of chemical characteristics of gold-ore-forming magmas that are now widely adopted for gold exploration by mining companies. However, a significant fraction of sites identified by these discriminants as gold fertile fail to yield ore, so refinement is needed. Secondly, some common igneous minerals, such as zircon and apatite, inherit from their parent magma the distinctive chemical indicators of gold fertility and survive sedimentary transport substantial distances from their eroded igneous source, potentially providing a more widespread signal for identification of watersheds containing gold-fertile igneous rocks. Empirically and experimentally calibrating chemical discriminants of gold-ore-forming igneous suites as compared to ordinary, gold-infertile igneous suites is expected to significantly enhance gold exploration success throughout Australia.							

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LP190100968 Preen, Prof David B	The Linking for Life Project will identify pathways to wellbeing and better social outcomes across the life-course for high-risk/vulnerable individuals and their families to streamline service provision, improve outcomes and identify cost-efficiencies across government agencies. The work will expand cross-sectoral data linkage capability, enhancing research capacity to generate evidence-based policy to improve integrated service delivery across government. The project will also trial innovative data linkage models including the creation of data repositories to improve efficiency for data provision and access, which will have application nationally and enable more timely access to whole-population linked cross-sector data.	259,764.00	264,960.00	269,996.00	276,508.00	285,908.00	1,357,136.00	DEPARTMENT OF HEALTH OF WA, DEPARTMENT OF EDUCATION, MENTAL HEALTH COMMISSION, DEPARTMENT OF JUSTICE, DEPARTMENT OF TREASURY, WESTERN AUSTRALIA POLICE, THE SAX INSTITUTE
	National Interest Test Statement Despite Australia's success on a range of wellbeing indicators, not all Australians fare equally. Developing an integrated understanding of individual and family-level factors that impact upon people's ability to reach their full potential has the capacity to reduce vulnerability in areas such as child abuse/neglect, criminal offending, education, mental health and disability. Improved knowledge of the impact of contexts and timing of services will facilitate reductions in the social and economic costs to individuals, families and society. The Linking for Life Project will inform State and Commonwealth intervention strategies to improve outcomes in priority areas (eg, child protection, domestic violence, public mental health, education), provide a best-practice model for evidence-informed policy, and build capacity for cross-sector research including economic assessment. This will enable improved provision of government services and better life chances for the most vulnerable groups in our society.							
	The University of Western Australia	1,163,176.00	1,139,186.00	1,170,327.00	564,708.00	521,278.00	4,558,675.00	
	Western Australia	1,163,176.00	1,139,186.00	1,170,327.00	564,708.00	521,278.00	4,558,675.00	
		16,281,296.00	**16,864,016.00**	**15,777,455.00**	**2,530,752.00**	**960,763.00**	**52,414,282.00**	

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New South Wales								
The University of New South Wales								
LP190100029 Nordon, Dr Robert E	The aim of this research is to develop the next generation of cell sorters to scale production of viable sperm and other cell types. Our approach is to understand the factors that control the migration of cells in an electric field so that we can design large-scale devices to purify cells using electrophoretic separation. The outcomes of this research enable large-scale production of viable sperm for human and animal-assisted conception, benefiting infertile couples and the livestock breeding industry. Successful development of an efficient cell separation technology would add significant commercial value to the Australian biomanufacturing sector. **National Interest Test Statement** This fundamental applied research is in the National Interest because it is required for commercial development of the next generation of cell separation devices to increase production of purified cells for biotechnology and medical applications in Australia and Internationally. The project will focus on production of high-quality sperm for the livestock breeding industry and human assisted reproduction. Successful development of an efficient cell separation technology can also be applied to blood banking, plasma product separation, cellular diagnostics and cellular therapies. This technology will be commercialised by an, ASX-listed company, Memphasys, who will manufacture cell separators locally, adding commercial value and expertise to the Australian Medical Device Industry.	141,731.00	201,724.00	205,997.00	0.00	0.00	549,452.00	MEMPHASYS LIMITED
	The University of New South Wales	141,731.00	201,724.00	205,997.00	0.00	0.00	549,452.00	
	New South Wales	141,731.00	201,724.00	205,997.00	0.00	0.00	549,452.00	

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Tasmania								
University of Tasmania								
LP190100035 Carey, Dr Rebecca J	The project aims to develop new innovative image analysis techniques to reconstruct the architecture of the volcanic host at four highly prospective hydrothermal-magmatic ore deposits, and investigate the properties of rocks that favour high-grade ore mineralisation. Expected outcomes of this project include next-generation automated techniques for volcanic facies analysis, and predictions of where hydrothermal alteration is most prospective for mineralisation. Both outcomes are relevant to the discovery of volcanic-hosted mineralisation globally. This project will provide significant benefit to the Australian mining industry by diversifying ore exploration strategies in the Australian crust, and will train the next generation of explorers.	165,512.00	170,278.00	164,034.00	0.00	0.00	499,824.00	EVOLUTION MINING LIMITED, GEOLOGICAL SURVEY OF NSW, DEPT OF STATE GROWTH, OCEANAGOLD, THE UNIVERSITY OF AUCKLAND, NZ, UNIVERSITY OF STRASBOURG FRANCE
	National Interest Test Statement This project will contribute to new ore exploration strategies that will enhance mineral discovery and lead to better revenues to Industry, and tax dollars to the Australian government. Enhancing the efficiency of exploration in the Australian mining sector will drive improvement of the national natural resources export sector, and increase job opportunities in Australia including rural areas. This project brings together international experts and partners who will provide critical samples, data and expertise towards the fundamental understanding of the Australian crust. This project will strengthen the University of Tasmania's links with the Australian mining industry, provide valuable training for a postdoctoral researcher, two PhD students and one Honours student, and be used for education purposes in industry short-courses and higher degree research training.							
	University of Tasmania	165,512.00	170,278.00	164,034.00	0.00	0.00	499,824.00	
	Tasmania	165,512.00	170,278.00	164,034.00	0.00	0.00	499,824.00	
		307,243.00	**372,002.00**	**370,031.00**	**0.00**	**0.00**	**1,049,276.00**	

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New South Wales									
Australian Catholic University									
LP190100387 Edwards, Prof Susan E	This project aims to identify the practices enacted and shared amongst young children, their families and educators in digital society.The project is significant because in digital society families and educators face new demands ensuring technologies are used in the best interests of young children. Knowledge about practices in digital society informs adult decision-making using technologies with, by and for young children in the early years. The outcome is a new Online Tool for the Partner Organisations to share exemplar practices benefiting Australian children, their families and educators with new resources, materials and programs in areas including: digital media production, cyber-safety education, digital play and digital parenting.	44,500.00	117,500.00	154,000.00	160,500.00	79,500.00	0.00	556,000.00	AUSTRALIAN BROADCASTING CORPORATION, AUSTRALIAN FEDERAL POLICE, THE ALANNAH & MADELINE FOUNDATION, DEEPER RICHER, EARLY CHILDHOOD AUSTRALIA INC, ESAFETY COMMISSIONER, RAISING CHILDREN NETWORK (AUSTRALIA) LIMITED
	National Interest Test Statement Adults who educate and care for young children receive inconsistent messages about what is in the interests of young children growing up in digital society. Some national and international guidelines recommend restricted use of technologies in the early years (AAP, 2016; Dept Health, 2018; WHO 2019). Other guidelines recommend technology use relative to family circumstances (RCPCH, 2018). Still others suggest a combination of restriction and relativity (EAPECCOG, 2018). Such inconsistent recommendations make adult decision-making about digital technology use by young children difficult to achieve. This project addresses the problem of inconsistent recommendations in the early years by working with leading national organisations to build a new Online Tool. The Online Tool will feature exemplar practices in the best interests of young children in digital society. Organisations can use the Online Tool to inform their service provision, reaching Australian children, families and educators with new resources, materials and/or programs nationwide.								
	Australian Catholic University	44,500.00	117,500.00	154,000.00	160,500.00	79,500.00	0.00	556,000.00	
Macquarie University									
LP190100314 Fryirs, Prof Kirstie A	It's happening! Rivers in coastal NSW are showing signs of recovery. 25 years of improved management has increased the structural and vegetative roughness of river channels. Getting the ‘fibre’ back into rivers has impacted most positively on flood hydrology, but less so on riparian vegetation quality. This project aims to understand how river recovery occurs, its impact on flood flows and test new techniques to improve vegetation quality. It will investigate where corridors of recovery are, where to prioritise rehabilitation and the cost:benefit of working with recovery. This will benefit public policy, improve flood and drought risk analysis, and change decision-making and rehabilitation practice - essentially future proofing our rivers.	100,000.00	200,000.00	200,000.00	100,000.00	0.00	0.00	600,000.00	LANDCARE AUSTRALIA LIMITED, LOCAL LAND SERVICES

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	National Interest Test Statement Of 81,000 km of stream length in coastal valleys of NSW, 55% is showing signs of recovery. This is a good news story for the river management industry, including public agencies, businesses, landowners and scientists who have worked tirelessly, and invested heavily over 25+ years to tip the balance. Our industry partners now need proof of concept that river recovery is happening at the regional scale and to fully understand the geomorphic and vegetative processes by which recovery has come about so they can work with it in on-ground practice. They also need a scientific evidence base to feed decision-support systems used to identify where corridors of river recovery are and prioritise future management activities. It is in Australia's national interest to ensure river recovery continues, our rivers have a sustainable and resilient future and can provide the ecosystems services upon which society depends – essentially future proofing them against floods, droughts and anthropogenic disturbance. Enhancing river recovery will minimise the impact of poor river health on communities, the economy and environment.								
LP190100574 Earl, A/Prof Joanne K	We aim to improve retirement planning through the design and application of a new model integrating financial advice with career and health planning to optimise financial and psychological outcomes. We will test a multidisciplinary, holistic model of advice combining specialist knowledge in careers, health, and finances. Expected outcomes of the project include evaluating the use of a broader range of experts during retirement planning and developing a model for the future training and development of financial advisers.By optimising the timing of workplace exit, we aim to decrease reliance on pensions and encourage earlier and on-going engagement in the retirement planning process. This will provide significant social and economic benefits.	53,121.00	106,265.50	109,508.00	56,363.50	0.00	0.00	325,258.00	ALLIANZ AUSTRALIA INSURANCE LIMITED
	National Interest Test Statement This project will have significant social and economic benefits to the Australian community.The Royal Commission into Banking, Superannuation and Financial Services outlines the devastating financial, emotional and psychological consequences of poor advice.This is especially true in the lead up to retirement, as exiting work offers little or no replacement income to cover losses. Despite evidence linking retirement planning to positive psychological and financial outcomes, there are still 1 million people without a plan.Of those that do plan many people leave the workforce too early, have insufficient funds or exit unexpectedly due to ill-health.The evidence points to the need for better models of retirement planning that help people to engage earlier, promote planning across a broader range of areas and teach a process of planning that lasts a life-time.Our project will re-engineer current advice processes by integrating financial advice with career and health planning. This multidisciplinary advice model will help to optimise psychological, financial and health outcomes leading up to and during retirement.								
LP190100590 Ens, Dr Emilie-Jane	Tropical Coastal Floodplains are an iconic feature of northern Australia; however, they are experiencing widespread degradation due to complex interactions between feral ungulates and relative sea level rise. Using cross-cultural multidisciplinary methods, this project will discover if feral ungulate control by the Aboriginal Yirralka Rangers will reduce vegetation decline and erosion and enhance floodplain resilience to sea level rise. This project will provide significant new data to inform feral ungulate management strategies as well as coastal carbon models as these processes are likely to create a carbon source rather than sink. Our collaborative science will have local to national benefits for natural and cultural resource management.	76,500.00	163,000.00	177,000.00	90,500.00	0.00	0.00	507,000.00	LAYNHAPUY HOMELANDS ABORIGINAL CORPORATION
	National Interest Test Statement Disentangling the drivers of floodplain vegetation, soil change and carbon storage will deliver insight for management of northern Australia's vast coastal floodplains. These floodplains are important for tourism, recreation, Indigenous cultures and ecology and hence, play a significant role in the Australian Government's plan to "Develop the North", thus making this project nationally relevant. Furthermore, 45% of the Northern Territory coastline is owned by Indigenous groups who are grappling with management of the complex interactions between feral ungulates and relative sea level rise. The project has been developed in close collaboration with local Yolngu Traditional Owners and a suite of renowned environmental scientists and aims to advance Australia's capacity for high level cross-cultural science to tackle challenging multi-disciplinary land management problems.								

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LP190100676 Zheng, Dr Xi	In this project, Macquarie University will collaborate with UTS and SilverQuest to develop an innovative safety-preserving ecosystem for autonomous driving. This system will not only be adopted by SilverQuest's customers (automotive companies) to secure their latest autonomous driving models, but also be commercialised as a toolset that can be plugged into existing autonomous vehicles to detect and prevent malicious attacks on autonomous driving models. The project will lead to two innovations: in theory design an attack detection and prevention ecosystem for autonomous driving and in application implement a safety analysis toolset for industry-scale autonomous systems. **National Interest Test Statement** Our system will fundamentally reshape existing security analysis in the autonomous driving environment. The outcomes will not only benefit automotive companies, but also lay the foundations for security analysis in other domains such as autonomous military systems, autonomous flying drones and other mission-critical autonomous systems in Australia. It will provide a safety guarantee and improve robustness for autonomous systems that will maximize Australia's competitive advantage in autonomous industry and military systems.	54,787.50	111,765.00	116,139.00	59,161.50	0.00	0.00	341,853.00	SILVERQUEST CONSULTING PTY LTD
	Macquarie University	284,408.50	581,030.50	602,647.00	306,025.00	0.00	0.00	1,774,111.00	
Southern Cross University									
LP190100271 Eyre, Prof Bradley D	Freshwater streams are disproportionately large producers of greenhouse gases. Identifying the factors controlling their greenhouse gas production is critical as stream function is increasingly altered by both changing rainfall patterns and human pollution. This project aims to resolve the factors controlling stream greenhouse gas production. It will apply an unprecedented combination of continuous stream function and intensive isotope measurements to perennially flowing and intermittent streams in disturbed and undisturbed landscapes. This project is significant because it will quantify the changing role of streams in greenhouse gas emissions. Outcomes will provide critical information for managing Australia's freshwater resources. **National Interest Test Statement** The outcomes of this project will provide new information for effectively monitoring Australia's freshwater resources, which are under increasing threat from both pollution and climate change. Councils spend millions every year measuring a suite of water quality parameters, but can struggle to connect parameters to environmental health, and are forced to overlook the 70% of Australian waterways that seasonally run dry. This project will produce practicable approaches for measuring biological activity in both wet and dry streams, and connecting activity to key ecosystem services. The findings from this project will directly impact the management, rehabilitation, and protection of Australia's waterways. The improved management made possible through these findings is increasingly important as decreased rain and increasing temperatures drive demand for vanishing freshwater resources.	57,911.00	125,728.00	119,556.50	51,739.50	0.00	0.00	354,935.00	GEOLINK CONSULTING PTY LTD AS TRUSTEE FOR GEOLINK UNIT TRUST, UNIVERSITY OF LIEGE
	Southern Cross University	57,911.00	125,728.00	119,556.50	51,739.50	0.00	0.00	354,935.00	

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The University of New South Wales									
LP190100069 Gibson, Dr Prudence	The project aims to aesthetically redefine engagement with the plant collection at Royal Botanic Gardens Herbarium (RBG) Sydney and to communicate its artistic, cultural and heritage value to the public through a Public Program of creative arts case studies. It's expected that new insights will arise from an environmental art methodology utilising the digitisation of the Herbarium specimens, so that audiences can interactively experience the plant archive through narratives that activate plants as underpinning ecosystems. Benefits to partners RBG, Bundanon Trust and Open Humanities Press will include the digital expansion of audience engagement with the Herbarium at RBG and Mt Annan and communication of collection's significance. **National Interest Test Statement** The RBG Herbarium is Australia's oldest scientific institution and national archive. The RBG is digitising its collection which provides a unique opportunity to work with experts at UNSW to create an expansive digital portal enabling access to this important national collection in new and different ways providing scholars and the public with a new experience when accesing the collection of the RBG in ways that go beyond normal web based archival approaches. The significance nationally is in improved accessibility to the entire digital archive which will enable the RBG to better fulfill its national and international outreach. The solution goes beyond normal web based archining to create a better user experinece when interogating the archive.	25,705.00	90,412.00	122,480.00	57,773.00	0.00	0.00	296,370.00	THE ROYAL BOTANIC GARDENS & DOMAIN TRUST, BUNDANON TRUST, OPEN HUMANITIES PRESS
LP190100113 Chu, A/Prof Dewei	This project aims to develop novel cathode coating materials towards more durable and powerful energy storage devices. Lithium ion battery will be constructed based on perovskite oxides to provide high capacity and stability for potential applications in electric cars, mobile phones and internet of things. The project will address fundamental challenges in this field by developing high voltage cathode coated with nanoionic thin layers. Combined with new materials fabrication techniques and innovative strain engineering, the expected outcome is high performance cathodes with enhanced rate capability and cycling life, low fabrication cost and production scalability. **National Interest Test Statement** In this project, a cost-effective, and high capacity energy storage system will be developed for wide applications in electric cars, mobile phones, and other electronic devices. There is a significant opportunity for Australia to be involved in the application of this technology in a multi-billion-dollar market of energy storage devices. Based on the research team's strong track record in commercialising advanced energy materials and devices technologies, intellectual properties generated from this project will be licensed to local and/or international industries, thus the project has great potential to generate direct economic benefits to Australian communities. The success of the project will also expand the knowledge base of Australian university and industry in advanced functional materials and devices through intensive collaborations. The project will provide an ideal platform for training high quality research students based on the complementary expertise of the team.	67,548.00	137,368.00	143,892.50	74,072.50	0.00	0.00	422,881.00	QI-AO NEW MATERIAL TECHNOLOGY DEVELOPMENT CO., LTD., AOTOL PTY LTD
LP190100122 Saydam, Prof Serkan	Premature brittle failure of rock & cable bolts due to stress corrosion cracking can cause fatalities and serious damage, and has been reported in several mining operations across Australia and world-wide. The evidence suggests that microbial activity is a contributing factor. The project aims to implement experimental methodologies to determine the specific conditions responsible for bolt failure and develop novel prevention techniques applicable in underground mines. The benefits of this research will be improved understanding of the environment causing catastrophic failure of bolts and avoidance of potential hazards & economic loss in mining projects. This will lead to improved safety & increased productivity in mining operations.	115,370.00	204,646.00	222,289.00	133,013.00	0.00	0.00	675,318.00	ACARP, JENNMAR AUSTRALIA PTY LTD, ILLAWARRA COAL HOLDINGS PTY LTD, SPRINGVALE COAL PTY LIMITED, ANGLO AMERICAN LTD

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	National Interest Test Statement Premature failure of rock and cable bolts due to stress corrosion cracking (SCC) is now being reported in several mines across Australia and world-wide and evidence suggests that microbial activity is a contributing factor. This project aims to identify the factors responsible for microbiologically induced stress corrosion cracking (MISCC) of bolts in underground mines and also to implement strategies for preventing such failures. The benefits of the research will be improved understanding of the role played by microbiological species in SCC of steels and identification of the features that are important for inhibiting such activity. This will lead to improved safety and increased productivity in underground mines resulting in better viability and also assist Australia to maintain its leading role in operating best practice mines and applying state of the art technologies.								
LP190100140 Yao, Dr Lina	The Internet of Things (IoT) together with the rising popularity of smartphones opens a new world for many exciting opportunities. The overall goal of this project is to develop new algorithms and data analytical techniques in an IoT environment that can accurately monitor and analyse personalised daily activities on a continuous, real-time basis. The expected result of this project will support many critical applications such as better wellness tracking and lifestyle-related illness prevention, which will be particularly critical to Australia's aging population. This project will also serve as a vehicle to educate and train Australia's young scholars and engineers.	55,000.00	110,000.00	110,000.00	55,000.00	0.00	0.00	330,000.00	PIXELFORCE SYSTEMS PTY LTD
	National Interest Test Statement Lifestyle-related illnesses such as lack of exercise are on the rise globally and such problematic lifestyle choices often result in significant disease burdens and economic impact on healthcare systems. The technical outcomes resulting from this project will not only add significant capability to the partner organisation, but also be readily used in developing many innovative and high payoff applications that will provide significant contributions to human society and the Australian economy.								
LP190100291 Moseby, Dr Katherine E	Predation by introduced cats and foxes causes extinction and decline in Australian mammals. Protecting threatened mammals inside fenced sanctuaries is effective but they can become overpopulated, inbred and more naive to predators over time. This leads to a dwindling hope of ever restoring them to their natural habitat. Previous research has shown that exposing threatened mammals to low levels of cat predation in large fenced paddocks improves their anti-predator behaviour, changes their physical appearance and improves survival. This grant seeks to understand the mechanisms (genetic/learning) behind these changes in order to harness and upscale our results and facilitate co-existence between native mammals and introduced predators.	103,589.00	201,234.50	176,283.00	78,637.50	0.00	0.00	559,744.00	THE TRUSTEE FOR ARID RECOVERY TRUST, BUSH HERITAGE AUSTRALIA
	National Interest Test Statement Introduced predators are a leading cause of population decline and extinction in Australian native mammals. Cats and foxes are widespread and a major threat to more than 120 threatened species. Our native species have not evolved with cats and foxes and do not have the appropriate anti-predator responses: avoiding detection, fast escape, cryptic behaviour. In response, we place rare animals behind predator-proof fences and offshore islands which protects them in the short term but isolates them from predators and exacerbates their naivety. We have trialed a different approach which exposes native mammals to low densities of feral cats to facilitate learning and accelerate natural selection. We found improvements in anti-predator behaviour, physical traits and survival after only 3 years. Our results aim to provide significant environmental benefits by facilitating co-existence between native mammals and introduced predators thus improving the conservation status of threatened species, preventing extinctions and enabling more Australians to view and interact with our unique native wildlife in the wild.								
	The University of New South Wales	367,212.00	743,660.50	774,944.50	398,496.00	0.00	0.00	2,284,313.00	

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The University of Newcastle									
LP190100378 Wheeler, Prof Craig A	Comminution is a key operation in mineral processing that utilises grinding mills to reduce the size of ore for further mineral enrichment processing. The aim of this project is to provide a step change improvement in the operational efficiency and service life of grinding mills through the development of advanced numerical models to simulate the grinding mill process. The outcome will be a hierarchical deep learning program to select optimal model parameters from which computational algorithms will optimise grinding mill geometries. This research project will deliver substantial improvements to equipment used to process our most valuable exports and result in immediate industry impact.	100,000.00	200,000.00	172,500.00	72,500.00	0.00	0.00	545,000.00	BRADKEN RESOURCES PTY LIMITED
	National Interest Test Statement The economic wealth of Australia is heavily dependent on the resource-based industries, notably those associated with mining and mineral production. With the current raw material market shift towards emerging minerals, such as copper and gold, it is critical for the Australian mining industry to undertake step changes to deliver safer and increased productivity to meet the significant demand both nationally and internationally, particularly when the global copper demand from electric vehicles is expected to soar from current levels to be nine times higher by 2027. Mineral processing is the most important stage of copper and gold production, during which a comminution circuit is utilised to reduce the size of the ore materials for further mineral enrichment processing. The comminution circuit often accounts for 30% to 50% of the total production cost. This project will provide step change improvements in the operational efficiency and service life of grinding mills by combining novel measurement and design methodologies, with the latest technological developments in the Internet-of-Things and deep learning.								
	The University of Newcastle	100,000.00	200,000.00	172,500.00	72,500.00	0.00	0.00	545,000.00	
The University of Sydney									
LP190100093 Park, Prof Robert	This project aims to reduce the impact of myrtle rust, an invasive plant disease. Myrtle rust is a globally significant biodiversity threat that is rapidly spreading to new regions. It affects many iconic native species as well as impacting commercial industries. The expected project outcomes are; a comprehensive understanding of the host genes involved in successful plant defence, and of the pathogen genes involved in the establishment of parasitism. The project will employ new approaches that enhance the application of biotechnology to Australian biosecurity. Key expected benefits are; gene-specific tools for plant breeders and conservation land managers, and improved preparedness for the threat posed by new rust strains.	71,500.00	136,500.00	123,500.00	58,500.00	0.00	0.00	390,000.00	NEW ZEALAND INSTITUTE FOR PLANT AND FOOD RESEARCH, OFFICE OF ENVIRONMENT AND HERITAGE NSW , ATTIA LTD, AUSTRALIAN FLORA FOUNDATION INC
	National Interest Test Statement This project addresses the National Science & Research Priority “Soil and Water” and in particular “New and integrated national observing systems, technologies and modelling frameworks across the soil-atmosphere-water-marine systems.” The project will improve Australia’s response to the impacts of myrtle rust through improved biosecurity capacity. The key outputs will be fundamental knowledge about the genetic basis to myrtle rust resistance and the genetic characteristics of the pathogen. Further key benefits are the advancement of knowledge into disease resistance in woody plants with important potential economic impacts. The results of this project will have direct applications in plant breeding and more broadly for woody crop production.The impacts of these findings will inform land managers, plant breeders and biosecurity surveillance to reduce the myrtle rust risk to native flora and plant-based industry.								

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LP190100117 Cobb-Clark, Prof Deborah A	This Project aims to prevent poor Australian children from becoming poor adults by developing scientific evidence and creative policy approaches to overcome entrenched disadvantage. The Project will generate new knowledge on how social assistance dependence is linked across generations using new Australian data. Expected outcomes are the identification of i) the causal link between parents' and children's social assistance dependence; ii) the pathways through which youths overcome disadvantage; and iii) the role of family structure in transmitting disadvantage. Transforming the evidence base, the findings will have significant benefits in redesigning the Australian social safety net, promoting social and economic mobility. **National Interest Test Statement** This research advances Australia's national interest by developing an extensive and enduring source of knowledge about the causes and consequences of intergenerational disadvantage. Through partnership with the DSS, this evidence base will inform novel policy options for supporting vulnerable Australians, contributing to the success of the Government's Priority Investment Approach (announced in the 2015-16 National Budget). This research advances Australia's national interests by giving us a better understanding of the ways that disadvantage is passed from Australian parents to their children allowing government funds to be better targeted toward alleviating entrenched disadvantage and helping Australia achieve its 2030 Agenda for Sustainable Development Goals: ending poverty; promoting good health and well-being; ensuring quality education; and reducing inequality. Finally, this research advances Australia's national interests by placing Australia at the forefront of international efforts to identify first-best policy options for promoting social mobility and enhancing the equality of opportunity.	42,000.00	102,000.00	122,000.00	62,000.00	0.00	0.00	328,000.00	DEPARTMENT OF SOCIAL SERVICES
LP190100143 Dehghani, Prof Fariba	The project aims to improve the effectiveness of probiotics by developing a targeted delivery system to the colon. This interdisciplinary research will generate new knowledge in the field of microbiota and develop new delivery systems for live microorganisms and other active compounds. Expected outcomes include increased understanding of the factors affecting the viability of probiotics during storage and passage through the gastro-intestinal tract, the establishment of probiotics into gut flora, and how this incorporation affects the dynamics of gut microbiota. The new technology can be utilised across a wide range of therapeutics that target the colon to promote the well-being of our society through commercialisation by industry partner. **National Interest Test Statement** Probiotics are currently recommended by health professionals for symptomatic relief of chronic inflammatory gastrointestinal conditions and various types of diarrheal illnesses. However, there is considerable scope for new formulations with improved and validated efficacy and extended shelf life. We will address the current issues concerning probiotic delivery, particularly loss of viability and activity, by designing a new strategy for the colon targeted delivery of probiotics. This project will broaden the research fields of stimuli-responsive delivery systems and directly benefit our industrial partner for marketing highly effective probiotics. Development of this proprietary technology that will prolong the shelf life and viability of probiotics will remarkably increase their export globally and bring Australia to the forefront for delivery of viable microorganisms and other active compounds with therapeutic efficacy. The development of target probiotic products will enable superior treatment of chronic health problems that will yield major benefits for the Australian society.	71,800.50	144,408.00	147,993.50	75,386.00	0.00	0.00	439,588.00	PHARM-A-CARE LABORATORIES PTY. LIMITED
LP190100511 Chan, Prof Hak-Kim	This project aims to develop an innovative optical tomography technology capable of direct and real-time measurement of the surface area of airborne particles. By coupling advanced laser diagnostic tools with physiological models and in vitro characterisation techniques, this project will determine the hitherto unknown fundamental and critical relationships between the surface area of an aerosol and its dissolution when delivered to a target. The Project's outcomes will enable aerosol device manufacturers to develop and market significantly more advanced and highly specific products, thus conferring a competitive advantage.	55,452.00	114,518.50	126,124.00	67,057.50	0.00	0.00	363,152.00	PROVERIS SCIENTIFIC CORPORATION

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	National Interest Test Statement Aerosol sprays are critical to our agriculture, pharmaceutical and additive manufacturing industries. Resolving the significant challenges related to understanding, monitoring and controlling these sprays is increasingly urgent. There is currently no simple commercial instrument that can provide the necessary real-time monitoring of aerosol-particle surface area - a critical measure for assessing the quality of any new aerosol delivery device. Optimising aerosol devices will reduce product waste thus generating economic and environmental benefits and opens the door for the development of valuable Australian IP. Achieving the new fundamental understandings for such nuanced control offered by this Project will confer competitive advantages to this broad range of critical Australian industries and foster ongoing relationships between the PO and Australian Universities.								
	The University of Sydney	240,752.50	497,426.50	519,617.50	262,943.50	0.00	0.00	1,520,740.00	
University of Technology Sydney									
LP190100074 Morris, Prof Alan	This project aims to investigate the circumstances of people on the social housing waiting-list and how they manage their everyday lives while waiting for a social housing property to become available. It also aims to conduct a review of how social housing waiting list assessments are done and profile the waiting list population. Drawing on in-depth interviews, the study expects to generate new knowledge on different groups of applicants. Expected outcomes include an enhanced understanding of the impacts of being on the waiting list for extended periods. This study will provide significant benefits as the high quality evidence produced should enhance policymakers' understandings of applicants' circumstances and lead to better outcomes.	46,800.00	90,650.00	92,000.00	48,150.00	0.00	0.00	277,600.00	SHELTER NSW INCORPORATED, ANGLICARE TASMANIA INC, HOMELESSNESS NSW INCORPORATED, ST GEORGE COMMUNITY HOUSING LIMITED, MICAH PROJECTS LIMITED, QUEENSLAND SHELTER INCORPORATED, WENTWORTH COMMUNITY HOUSING LIMITED, HOUSING PLUS, COMMUNITY HOUSING LIMITED
	National Interest Test Statement The study aims to develop a profile of people on the social housing waiting list (waitees), obtain an understanding of their circumstances while waiting and examine the impacts of being on the waiting list for extended periods. The provision of safe, affordable and secure housing for all Australians is a matter of national interest, particularly when those seeking such housing are already members of society's most disadvantaged groups. About 189,000 Australian households are on the social housing waiting list and this wait for housing is likely to have implications for their current housing, employment prospects, the education of their children, sense of home and community, and health and well-being. A better understanding of these effects and current circumstances gives Australian governments and relevant organisations the tools to direct policy interventions towards priority issues and identify current modes of service provision that may not be working effectively. Improved housing situations will foster social inclusion, reduce the pressure on service providers, and contribute to positive health outcomes.								
	University of Technology Sydney	46,800.00	90,650.00	92,000.00	48,150.00	0.00	0.00	277,600.00	

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University of Wollongong									
LP190100439 Indraratna, Prof Buddhima N	Proper understanding of soil-water interaction is vital for sustainable development of floodplains, and to halt acid mine drainage caused by the oxidation of pyritic soil. Permeable reactive barriers (PRB) offer a cost-effective solution to neutralize acidified groundwater. The project aims to quantify the clogging potential of PRB's granular medium by coupling geotechnical fundamentals with integrated hydro-bio-geochemical processes. Time-dependent clogging will be evaluated through geotechnical laboratory & field testing. Expected outcomes are enhanced PRB design methods and sound geotechnical field monitoring to provide significant industry benefits, such as mine-site rehabilitation, increased productivity and infrastructure longevity.	95,000.00	195,000.00	190,000.00	90,000.00	0.00	0.00	570,000.00	DOUGLAS PARTNERS PTY LTD, GLENCORE COAL ASSETS AUSTRALIA PTY LIMITED, MANILDRA PTY. LIMITED
	National Interest Test Statement Acid sulphate soils (ASS) prevalent in organically-rich floodplains as well as acidified mine-water drainage in certain coal mines pose major geoenvironmental concerns, because, these acid-polluted effluents can cause (a) serious damage to the soil-water environment, (b) adversely affect the dairy and aquatic productivity, and (c) acid-attack on civil infrastructure. This project aims to quantify the performance of permeable reactive barriers (PRB) utilizing alkaline aggregates to neutralize groundwater and soil acidity prior to its discharge to nearby waterways. Expected research outcomes will be disseminated through scholarly publications, workshops and guidelines for the most appropriate geotechnical practices to be implemented in affected coastal terrains and coal mine rehabilitation. In the future, it is hoped that enhanced PRB design and field health monitoring will be adopted by the relevant industry and government organisations, which in turn should provide significant benefits in terms of enhancing agriculture/aquaculture productivity while extending the longevity of strategic infrastructure.								
	University of Wollongong	95,000.00	195,000.00	190,000.00	90,000.00	0.00	0.00	570,000.00	
Western Sydney University									
LP190100099 Soldatic, A/Prof Karen M	Over 1 million disabled Australians are from culturally and linguistically diverse (CaLD) communities, the majority of whom are ineligible for disability and multicultural services. CaLD persons with disability significantly rely on digital information systems, devices and platforms to secure their economic, social and cultural inclusion. Evidence to date documents the continual exclusionary impact of artificial intelligence (AI) behind such technologies in addition to its inaccessibility to complex end-users. Yet, AI is now central to socio-economic well being and inclusion. In partnership with community and industry, this project will inform future AI developments and policy increasing its adaptability, accessibility and affordability.	26,841.50	57,596.00	61,509.00	61,509.00	30,754.50	0.00	238,210.00	YOUR SIDE AUSTRALIA, WESTERN SYDNEY MRC, CASULA POWERHOUSE ARTS CENTRE , GALLERY LANE COVE + CREATIVE STUDIOS
	National Interest Test Statement For migrants, young and old, with disability, AI offers pathways for inclusion in everyday life. The project will examine how this group of more than a million Australians are using AI systems on their phones and in their homes. In so doing, it will build the first national database of how migrants with disability experience these systems. This evidence will be vital as Australia's health services seek to provide for an ageing and more diverse population efficiently and equitably. Through policy, media and agenda-setting outputs, the project will improve (a) how these groups can participate and be included; (b) how organisations can optimise critical service delivery; and (c) how technology providers and government can better design AI-driven employment, health and education systems. These outputs will help Australia stay at the forefront of innovation, produce more efficient and targeted support services, and improve the lives of people with disability and their carers.								

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LP190100436 Nolan, Dr Rachael H	Dry forest fuels are a precursor of large bushfires. This research aims to develop, for the first time, a model to reliably forecast the moisture content of live fuels (e.g. the foliage and fine branches of shrubs and trees). This will be achieved by combining (i) satellite-derived estimates of live fuel moisture content, (ii) forecasts of soil moisture, and (iii) plant physiological responses to soil dryness. Forecasts of live fuel moisture content will deliver an early warning system of the risk of bushfires. These forecasts will also facilitate improved planning of prescribed burns: if fuels are too dry there is a risk of burns escaping, conversely, if fuels are too wet there is a risk that burns will fail to meet objectives.	54,031.50	153,573.00	207,982.00	108,440.50	0.00	0.00	524,027.00	NSW RURAL FIRE SERVICE, OFFICE OF ENVIRONMENT AND HERITAGE NSW , ENVIRONMENT, PLANNING AND SUSTAINABLE DEVELOPMENT DIRECTORATE - DEPARTMENTAL
	National Interest Test Statement Bushfires have a large social and economic impact on Australia. For example, the 2009 Black Saturday bushfires were Australia's worst natural disaster, with 173 lives lost, over 2000 homes destroyed, and the economic damage estimated at over $4.4B. In 2013 bushfires again destroyed 203 homes, this time in the Blue Mountains. Bushfires also significantly impact on water resources, biodiversity and the capacity of forests to sequester carbon. Our research aims to develop, for the first time, physically based forecasts of the dryness of live forest fuels. These forecasts will provide an early warning system of the risk of bushfires, and facilitate improved outcomes for prescribed burning programs. These outcomes will ultimately aid fire managers in protecting lives and assets. Our fuel dryness model can also be applied to assessing long term changes in the likelihood of bushfires, which is critically important for understanding the risks posed by climate change to forests.								
	Western Sydney University	80,873.00	211,169.00	269,491.00	169,949.50	30,754.50	0.00	762,237.00	
	New South Wales	1,317,457.00	2,762,164.50	2,894,756.50	1,560,303.50	110,254.50	0.00	8,644,936.00	

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Queensland									
Griffith University									
LP190100186 Wilkinson, Prof Adrian J	This project aims to identify ways to improve patient care and enhance employee wellbeing of healthcare workers through better utilisation of employee voice practices that enable employees to speak up. We aim to do this by identifying and distinguishing between the types of practices used by these workers to speak up on issues concerning working conditions and patient care concerns. The project will identify the determinants of speaking up in healthcare and the consequences this voice has for quality of patient care and worker wellbeing. This will have significant benefits for hospital stakeholders, including improved patient care, employee satisfaction and retention, and hospital efficiencies. **National Interest Test Statement** The health sector is under increasing pressure to provide efficient and error-free service, while retaining high quality staff to provide those services. Meanwhile, there are reports of bullying, strikes and the inability of workers to raise concerns regarding patients and working conditions, with ensuing negative repercussions on patient care. By focusing on improving employee voice, we aim to harness the human talent to improve outcomes for hospitals, patients and healthcare workers. By determining how staff should approach voicing their concerns, this research will contribute to safe patient care, the reduction of errors and incidents and improved employee welfare. This will yield significant social and economic benefits, including improved efficiency in hospitals, better patient health outcomes and improved satisfaction of healthcare personnel. The research findings may also benefit other industries which rely on their staff to detect errors and where the safety and wellbeing of their employees and stakeholders is paramount.	41,000.00	79,000.00	77,000.00	39,000.00	0.00	0.00	236,000.00	METRO SOUTH HEALTH SERVICE DISTRICT
	Griffith University	41,000.00	79,000.00	77,000.00	39,000.00	0.00	0.00	236,000.00	
James Cook University									
LP190100635 Spandler, A/Prof Carl	This project aims to reveal the potential for undiscovered economic deposits of rare earth elements within the Australian continent. Future supply of these elements underpins societies transition to clean energy and embrace of high-tech applications. The project expects to greatly enhance our knowledge of Australia's endowment of rare earth element resources using an array of traditional and innovative geological research methods. Expected outcomes of this project include a greater understanding of how, where and when rare earth element orebodies form in the Earth's crust. This should provide significant benefits to exploring for—and discovering—new orebodies that are required to secure global critical metal supplies.	64,685.50	190,754.00	221,848.50	95,780.00	0.00	0.00	573,068.00	GEOSCIENCE AUSTRALIA, NORTHERN MINERALS LIMITED, GEOLOGICAL SURVEY OF NSW, GEOLOGICAL SURVEY OF WESTERN AUSTRALIA , GEOLOGICAL SURVEY OF QUEENSLAND, SOUTH32 LIMITED, NORTHX PTY LTD, UNIVERSITY OF CAMBRIDGE, UK

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	National Interest Test Statement Australia has vast potential to supply the rare earth elements that are essential for our transition to a high-tech, clean energy society. This project will define the geological processes responsible for the formation of rare earth element ores within the Australian continent, and will train the next generation of Earth scientists working towards recognizing and defining Australia's critical metal resources. This newly acquired knowledge will be used to develop novel geochemical and geophysical tools to aid new orebody discoveries, thereby accelerating Australia's role as a global supplier of these metals.								
	James Cook University	64,685.50	190,754.00	221,848.50	95,780.00	0.00	0.00	573,068.00	
The University of Queensland									
LP190100106 Hurter, Prof Dr Suzanne J	Management of gas and water resources is of significant importance to the Australian economy and society. Industry and government use digital modelling to assist in resources management. The first step in modelling is to correlate geological data and then use geostatistics to estimate properties in areas without data. This project aims to produce a new geological framework for the Surat Basin underpinned by new zircon ages and ages of fossils in sediments and a new geostatistical methodology to better represent flow properties in coal seams and aquifers. This is expected result in a more accurate modelling methodology that can be used by industry and government for modelling resources, including in other basins in Australia and worldwide.	83,761.50	153,217.50	94,456.00	25,000.00	0.00	0.00	356,435.00	ARROW ENERGY PTY LTD, SANTOS LIMITED, AUSTRALIA PACIFIC LNG PTY LIMITED
	National Interest Test Statement The advanced groundwater models will inform the long-term sustainable protection and use of the critical Great Artesian Basin (GAB) resource. They will be a key tool to optimise use of the GAB by rural communities and key industries, e.g. agriculture and mining, which are significant contributors to the Australian economy. The estimated combined value of GAB groundwater for agriculture, mining and urban water supply was $18.84 billion in 2016. In addition, use of the new techniques in coal seam gas (CSG) planning are expected to result in fewer wells to achieve production targets, assisting the industry to reduce production costs and to maintain 'social licence to operate' by reducing social and environmental impacts. The basin's CSG industry generated exports of $13.48 billion in 2018. Maintaining or increasing economic production from all sectors is fundamental to the economic, social and environmental structure of the GAB, with significant economic benefits at State and national levels. The new techniques will be able to be applied to other regions reliant on groundwater resources or gas development.								
LP190100131 Healy, Prof Karen E	This study aims to improve the experiences of, and outcomes for, Indigenous and non-Indigenous children in Out-of-Home Care (OOHC). Drawing on detailed longitudinal, qualitative interview data from children in out-of-home-care, their birth families and carers across geographically diverse sites in Queensland, the study will build a rich understanding of their experiences. Outcomes include improved knowledge of how to strengthen children's connections to culture and caring relationships during OOHC and how these connections shape children's well-being. Benefits include improved outcomes for children and better practice to achieve positive social, cultural and emotional well-being for those involved OOHC especially in Indigenous communities.	127,000.00	256,000.00	262,000.00	133,000.00	0.00	0.00	778,000.00	THE BENEVOLENT SOCIETY, CHURCHES OF CHRIST IN QUEENSLAND, UNITINGCARE, LIFE WITHOUT BARRIERS, ABORIGINAL AND TORRES STRAIT ISLANDER COMMUNITY HEALTH SERVICE BRISBANE, QUEENSLAND ABORIGINAL & TORRES STRAIT ISLANDER CHILD PROTECTION PEAK LIMITED, DEPARTMENT OF CHILD SAFETY

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	National Interest Test Statement In 2017-18, Australian governments spent $3.4 billion on Out-of-Home Care (OOHC). Despite this expenditure, outcomes for children in OOHC are often poor with research showing elevated rates of school non-completion, mental health concerns and substance misuse among these children and young people (Gypen et al, 2017). Our study will build knowledge to improve the experience and outcomes for children in out-of-home care, as well as their carers and birth families. Our research will also indicate ways to reduce the economic costs arising from OOHC by improving children's experiences and outcomes. Other benefits include enhancing the capacities of service providers, carers and birth families to support children's social and emotional well-being at key points in their development and enhancing understanding of the experiences of, and responsiveness to, the needs of Indigenous children, carers and birth families in their journeys through the OOHC system. The involvement of key Indigenous and non-Indigenous organisations will assist translation of our findings into better outcomes for children, families and carers.								
LP190100188 Neal, Prof Andrew F	The aim of this project is to identify how work roles should be designed for crew operating multiple Unmanned Aircraft (UA). Industry expects that the introduction of higher levels of automation in next-generation UA systems will reduce the operational costs associated with UA by enabling human crews to simultaneously manage multiple aircraft. The current project examines the safety and effectiveness of different types of work designs for these systems. The primary outcome will be a set of recommendations regarding the design of work roles for the crew of next-generation UA systems. Expected benefits include improvements in safety and cost-effectiveness of next-generation UA systems.	60,146.00	123,479.00	113,303.50	49,970.50	0.00	0.00	346,899.00	BOEING RESEARCH AND TECHNOLOGY AUSTRALIA
	National Interest Test Statement According to the Department of Foreign Affairs (2018), more than 50% of the value of Australia’s $403 billion worth of exports come from the mining and agriculture industries. The use of unmanned aircraft (UA) is becoming a highly valuable tool in both of these industries for increasing efficiencies in capability delivery and intelligence gathering across vast distances. Despite the value that UA can offer, the operational cost of these systems is constraining widespread adoption of the technology. The results of this project will contribute to the design of a new UA operating model in which a human crew can simultaneously operate multiple unmanned aircraft, which will substantially reduce the costs associated with UA operations. The results of this project will inform the design of safe and inexpensive UA systems that will offer a key competitive advantage to Australia’s primary industries.								
LP190100386 Nogita, Prof Kazuhiro	The process of hot-dip metal coating of steel has evolved to provide reliable products that find widespread application in many industries, including building and construction. This project aims to address and understand an intermittent processing problem using innovative approaches involving characterisation by synchrotron techniques and state-of-the art microscopy. Expected outcomes include increased manufacturing efficiencies by identifying the cause of an intermittent processing defect and implementing methods of controlling this defect. This will help BlueScope and Australia maintain a world-leading reputation for high-quality coating products for domestic and export markets.	58,841.00	117,682.00	117,682.00	58,841.00	0.00	0.00	353,046.00	BLUESCOPE STEEL LIMITED
	National Interest Test Statement Corrosion is estimated to cost 3% of the world’s GDP per year. Coating steel is one of the most commercially important processes for protection and there are significant international efforts to improve current coatings. The multilayered coating that develops when hot-dipping steel sheets with Al-Zn based alloys imparts significant corrosion resistance and has been in commercial use for decades. To satisfy future demands in the construction and building industries and remain competitive, innovative coating processes with reduced energy consumption and decreased CO2 outputs are required. This proposal aims to develop breakthrough steel coating processes and product innovations to enable the Australian steel industry to improve its global competitiveness through improved manufacturing technologies and sustainability. Providing a scientific rationale behind defect formation and implementing solutions will mitigate the risk involved with process uncertainty and the potential losses that would result if the frequency and duration of affected production time was to increase.								

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LP190100509 Botella, Prof Jose R	This project addresses the single biggest issue affecting the viability of pineapple farming in Australia and internationally: premature flowering leading to supply collapse. We aim to develop CRISPR technology to breed new pineapple varieties using non-GM approaches. Expected outcomes include the production of pineapples with resistance to premature flowering, as well as the technologies to deliver additional improvements in the future. The new varieties will benefit farmers through increased production, maximising supply capability for a rapidly growing internal demand. This will benefit Australian pineapple producers through higher profitability in existing markets, as well as enabling expansion into international and future markets. **National Interest Test Statement** Using the latest breeding technologies, this project will maximise not only current, but future pineapple production for Australian farmers. The technology developed will assist the $70 million Australian pineapple industry to expand, providing economic growth and jobs in rural communities. However, it will also place Australia as leaders in the field with the potential to commercialise the new breeding technologies internationally. In addition, adoption of the new varieties by overseas growers will generate further income via royalties from Plant Breeders Rights in the current $9b worldwide pineapple industry. Finally, this work will translate into greater food security, ensuring availability of fresh and healthy pineapples for Australian consumers.	75,000.00	152,500.00	162,500.00	135,000.00	50,000.00	0.00	575,000.00	TROPICAL PINES PTY LTD
LP190100699 Mark, Prof Alan E	Controlling morphology and self-organization at a molecular level is key to advancing the performance of optoelectronic devices such as organic light-emitting diodes and organic photovoltaic cells. Current device development relies on a costly and inefficient empirical design cycle (material synthesis followed by device fabrication and testing). In addition, the active layers often involve multiple components and their nano-scale morphology is difficult to probe experimentally. Recently developed molecular simulation techniques can provide unique insight into atomic-level structural details that determine device efficiency. The project will determine if such simulations are sufficiently accurate to be industrially useful. **National Interest Test Statement** The aim of the project is to validate a predictive approach that can be used to improve organic solar cells. Single junction organic solar cells have the potential to reach efficiencies of over 20% and to deliver light weight flexible photovoltaics at < $0.20/W. Working with Heliatek, the world leader in the commercialization of organic solar cells, the project will examine whether techniques developed to determine film morphology at an atomic level can be used to understand and predict the performance of these revolutionary devices. While this initial project is focused on solar cells, the methodology at the heart of the project can be applied to a wide range of other organic semiconductor materials and devices to facilitate the translation from basic science to industrial products. Falling under the priority goal of Lifting Productivity and Economic Growth, the aim of the work is to validate a unique tools that will help maximize the competitive advantage of Australia's rapidly growing organic semiconductor community.	34,000.00	68,000.00	34,000.00	0.00	0.00	0.00	136,000.00	HELIATEK
	The University of Queensland	438,748.50	870,878.50	783,941.50	401,811.50	50,000.00	0.00	2,545,380.00	
	Queensland	544,434.00	1,140,632.50	1,082,790.00	536,591.50	50,000.00	0.00	3,354,448.00	

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South Australia									
Flinders University									
LP190100071 Gardner, A/Prof Michael G	Translocation is a conservation strategy to help the plight of endangered species, and is becoming increasing important to mitigate against climate change. However translocations often fail. Theory suggests mixing individuals from different source populations would benefit species' genomic diversity and potentially success rates, however this is untested in animals. Also unclear is what parts of the genome are important for mitigating against climate change. Using an endangered lizard model, this project aims to understand how to best start new populations by 1) providing the first empirical test in terrestrial vertebrates of using mixed source populations; and 2) uncovering regions of the genome important for considering in translocations.	58,660.00	92,018.00	67,716.00	72,155.00	74,094.00	36,297.00	400,940.00	SOUTH AUSTRALIAN MUSEUM, DEPARTMENT FOR ENVIRONMENT AND WATER, CONSERVATION VOLUNTEERS AUSTRALIA ENTERPRISES, RENEWABLE ENERGY SYSTEMS PTY LTD, THE FIELD NATURALISTS SOCIETY OF SA INCORPORATED, FLOW POWER, NATURE FOUNDATION SA INC, ADELAIDE AIRPORT LIMITED
	National Interest Test Statement Australia has a unique flora and fauna and these are under threat from environmental changes. This project examines how to best preserve species under threat using a truly unique lizard, the pygmy bluetongue, as an exemplar. The pygmy bluetongue only exists on sheep grazed land in the mid-north of South Australia and is, currently, dependent on the goodwill of farmers for its survival. Ultimately, climate change will impact the lizards survival so we need to know how to move its distribution south and this project will create new knowledge about how we can best achieve this. The project has wide support from the Australian community, government and industry. Partners include The SA Museum, Adelaide Airport, renewable energy companies (FlowPower and RES Power), partners with management responsibilities (Department for Environment and Water SA) and conservation groups such as the Nature Foundation and Conservation Volunteers Australia Enterprises, evidencing the environmental and social benefits of this project to the Australian community.								
LP190100269 Wendt, Prof Sarah C	The project will generate new knowledge about how religious beliefs and practices are used by men to perpetrate domestic violence. Using a qualitative design this project will gain insights into how churches understand and respond to domestic violence; and identify and analyse the perpetration of spiritual abuse as a form of domestic violence. The significant innovation and benefit is interviewing Australian men about their understandings and use of violence through an ecclesiastical lens. The outcomes will enhance the knowledge base of domestic violence theory, serving as a platform to develop more effective policies and practice inside and outside religious settings to prevent domestic violence.	26,272.50	54,545.00	28,272.50	0.00	0.00	0.00	109,090.00	LUTHERAN CHURCH OF AUSTRALIA INC
	National Interest Test Statement The project will benefit religious communities and domestic violence agencies across Australia by providing foundation knowledge of how spirituality and religion influence intimate couple's lives, shape their experiences and perpetration's of abuse, and potentially aid in recovery from domestic violence. National impact on policy and practice inside and outside religious contexts is made possible by providing an evidence base in collaboration with a national church. By interviewing men firsthand about their use of violence opens up new opportunities to examine how specific religions confer legitimacy on gendered violence.								
	Flinders University	84,932.50	146,563.00	95,988.50	72,155.00	74,094.00	36,297.00	510,030.00	

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The University of Adelaide									
LP190100051 Breed, Dr Martin F	This project aims to address the sourcing of native seed for ecological restoration under global change. The great demand for native seed to deliver ecological restoration provides a clear need and responsibility to use this seed as efficiently as possible. This project expects to develop detailed new knowledge that links plant and environmental genomics, plant physiology, seed and soil biology in embedded experiments at post-mining rehabilitation sites. Expected outcomes include clear industry guidelines that refine seed sourcing strategies for ecological restoration for current and future climates. This should provide significant benefits for improved ecological restoration outcomes when using native seed today and into the future.	70,000.00	149,500.00	149,500.00	70,000.00	0.00	0.00	439,000.00	DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS, THE WESTERN AUSTRALIAN BIODIVERSITY SCIENCE INSTITUTE, AUSTRALIAN GENOME RESEARCH FACILITY LIMITED, HANSON CONSTRUCTION MATERIALS PTY LTD, TRONOX MANAGEMENT PTY LTD
	National Interest Test Statement This research contributes to the National Science and Research Priorities of ‘Resources’ and ‘Environmental Change’ for economic, environmental and social benefits. We will address the practical research challenge of increasing knowledge of environmental issues associated with resource extraction. We aim to better understand the issues around sourcing the best native seeds in ecological restoration projects, which impact the planting success and economic efficiency of post-mining restoration projects. We will provide options for responding and adapting to the impacts of global change on biological systems, urban and rural communities, and industry. We will develop predictive seed sourcing techniques by testing the resilience of local and non-local seed to climate change predictions. This will provide environmental benefits to the Australian community, firstly by improving the condition of ecosystems at mining restoration sites, and secondly by enabling restoration projects everywhere to be more sustainable and resilient under a changing climate.								
LP190100555 Austin, Prof Andrew D	This project aims to improve Environmental Impact Assessment and monitoring of subterranean ecosystems by developing a rigorous, credible and practicable environmental DNA assessment framework. Resource companies in Western Australia are mandated to assess groundwater biodiversity under Environmental Protection legislation. Current surveys are time-consuming (expensive) and biased toward common taxa. For regulators, stakeholders and industry involved in this project we will provide real-world information and cost savings through innovation in understanding patterns in species boundaries and detection of subterranean fauna. The outcomes will be directly applicable to monitoring subterranean ecosystems across Australia and internationally.	85,000.00	165,000.00	160,000.00	80,000.00	0.00	0.00	490,000.00	RIO TINTO LIMITED, BHP BILLITON IRON ORE PTY. LTD., CHEVRON AUSTRALIA PTY LTD AS OPERATOR OF BARROW ISLAND, SOUTH AUSTRALIAN MUSEUM, WESTERN AUSTRALIAN MUSEUM, DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS, THE WESTERN AUSTRALIAN BIODIVERSITY SCIENCE INSTITUTE, DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION

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	National Interest Test Statement As an Industry Linkage Project the intended research has been developed in close collaboration with three of the largest resource companies in Australia (Rio Tinto, BHP, Chevron) (end-users), two governmental biodiversity stakeholders (Western Australian (WA) Department of Biodiversity, Conservation & Attractions, and the WA Biodiversity Science Institute) and one organisation responsible for WA's environmental regulation (WA Department of Water & Environmental Regulation). As such the project aims to undertake research that delivers significant economic AND environmental outcomes to our partners, as well as being generally applicable across Australia and internationally. This project will 1) develop a framework of knowledge on the unique faunal diversity of the Pilbara region that has direct implications for conservation management; and 2) develop a novel environmental DNA (eDNA) approach using new assays and rigorous sampling methods for accurate, cost effective and reproducible monitoring of groundwater fauna that facilitate timely assessment of environmental impacts.								
LP190100561 Foster, A/Prof Robert K	This project aims to widen public access to different kinds of historical knowledge about colonial frontier conflict, and thereby to contribute to contemporary processes of truth telling and reconciliation. It will use the innovative technology of Story Map digital software to open up new dialogue on how different communities interpret the past. In addition to scholarly publications, outcomes include an updatable story-map of frontier relations for use by the partner museums and history organisations. Other expected public outcomes include a touring exhibition, education packs on frontier history for classroom use, and ongoing community applications of the Story Map digital database for use in regional reconciliation projects.	54,000.00	114,000.00	122,500.00	62,500.00	0.00	0.00	353,000.00	SOUTH AUSTRALIAN MUSEUM, THE HISTORY TRUST OF SOUTH AUSTRALIA, STATE LIBRARY OF SOUTH AUSTRALIA, STATE RECORDS, RECONCILIATION SOUTH AUSTRALIA INCORPORATED
	National Interest Test Statement Reconciliation Australia's biennial survey indicates that more than 80% of Australians are committed to acknowledging the history of Australia's contested frontiers. This project will make a profound contribution to Australia's national interest by building a regional historical story map of the colonial frontier that engages directly with current national concerns. By eliciting historical accounts across both rural and urban contexts, it will open dialogue on the nature of historical knowledge. Its collaborative methodology will engender broader social pathways for reconciliation that include the involvement of different community groups and cultural institutions. Its impacts will be realised in virtual and physical forms of display, both online and in public exhibitions curated by South Australia's principal cultural institutions. By bringing together different kinds of historical perspective to shed new light on South Australia's foundational histories of frontier conflict, the project will enable and encourage contemporary programs of reconciliation.								
	The University of Adelaide	209,000.00	428,500.00	432,000.00	212,500.00	0.00	0.00	1,282,000.00	
	South Australia	293,932.50	575,063.00	527,988.50	284,655.00	74,094.00	36,297.00	1,792,030.00	

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Victoria									
Deakin University									
LP190100459 Mansouri, Prof Fethi	Although the provision of social services in multicultural societies is one of the major factors that affect immigrants' integration experiences, it surprisingly remains under-researched. This project will systematically map the provision and impact of different service-delivery modes in three areas of interest to migrant groups - health, social and employment services. By using mixed-methods design, the project will assess the experiences and impact of the mainstreaming of social services on social inclusion, citizenship and human rights among migrant communities. Outcomes will include robust empirical evidence to plan policies and improve social inclusion of migrant communities through the effective provision of social services.	62,087.50	125,022.50	128,793.00	65,858.00	0.00	0.00	381,761.00	AUSTRALIAN MUSLIM WOMEN'S CENTRE FOR HUMAN RIGHTS INC., VICTORIAN MULTICULTURAL COMMISSION, ETHNIC COMMUNITIES COUNCIL OF VICTORIA INC
	National Interest Test Statement By producing the first mapping and assessment of different service provision modes on multicultural Australia, the project will contribute to the improvement of social inclusion through the effective programming of targeted and effective services, which is likely to induce economic and social benefits for society at large. The project will particularly benefit the end-users of social services in diverse communities by identifying the service-provision mode that has the most positive impact. Additionally, the project will benefit all stakeholders of service provision in Australia, to strengthen the ability of partner organisations, and all public and private service providers in Australia, to monitor and measure the provision of services for culturally and linguistically diverse (CALD) individuals and communities. Finally, the project will benefit the public debate by providing the first evidence to assess the impact of social service provision on social cohesion, citizenship and human rights of migrant communities.								
LP190100594 Xiang, Prof Yong	Due to Australia's unique geographical distribution and population density, many regional or remote areas lack infrastructural support and development, including telecommunications and electricity supply. It is important to provide information and communication services in such infrastructure-deficient environments. In this project, we will develop a first-ever commercially ready Fog information system, or FogIS in short, to enable localised information and communication services, while preserving users' privacy, in infrastructure-deficient environments. The deployment of this system will bring great benefits to Australia's economic growth, the quality of life, cybersecurity, and environment control in rural and regional Australia.	55,587.50	113,697.50	118,180.50	60,070.50	0.00	0.00	347,536.00	FLAG EXPLORE PTY LTD
	National Interest Test Statement Many of Australia's regional or remote areas lack infrastructural support and development, including telecommunications and electricity supply. The proposed privacy-preserving Fog information system in this project is an important step towards building practical, sustainable and scalable information and communications technology infrastructure in regional and rural areas, such as rural farms, remote national parks and regional towns. This will benefit various end-users including farmers, tourists, local residents, industries and governments, bringing tremendous benefits to Australia's economic growth, the quality of life, cybersecurity, and environment control in regional and rural areas. In addition, the outcomes of the project will advance the theory of Fog computing and enhance Australia's international competitiveness in this field. Furthermore, the project's platform will provide an excellent opportunity for the training of world class researchers to meet the future needs of the broader Australian innovation system. All of these greatly contribute to Australia's national interest.								
	Deakin University	117,675.00	238,720.00	246,973.50	125,928.50	0.00	0.00	729,297.00	

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La Trobe University									
LP190100054 Kirkby, Prof Diane E	This project brings political, economic and social history together with a feminist analysis to explore the Australian Council of Trade Unions' significance in shaping modern Australia. Positioned within a national framework of labour politics and economic restructuring, and an international context of Cold War adversarialism, the project goes beyond the ACTU's key role in workplace bargaining to an assessment of its international profile and the impact on the organisation of a feminising labour market and emergent women's leadership. In an innovative study that highlights the Hawke era to show the ACTU's history as one of transition to governance, we aim to reveal the potential of the Australian labour movement to effect change.	55,584.00	113,129.50	117,051.50	59,506.00	0.00	0.00	345,271.00	AUSTRALIAN COUNCIL OF TRADE UNIONS
	National Interest Test Statement This history of the Australian Council of Trade Unions provides a much-needed long-term analysis of the labour movement's significance in shaping modern Australia. By investigating how the ACTU effectively enabled the emergence of political leadership, especially among women, the project will bring a new understanding of a significant shaping influence on our national life. Documenting past practices and policies will expand knowledge of the recurring issue of gender bias in our public life. Showing how the organisation itself changed, and locating when and why it responded to and embraced grassroots social movements will heighten awareness of the processes by which community activism can translate into political governance. The study puts a currently localised Australian labour history into an international context and brings a new perspective to the ACTU's confrontation with recent economic challenges. Resulting outputs will inform discussion of the continuing place of trade unions on the national political stage and the development of strategies for managing transformations at work and in society.								
	La Trobe University	55,584.00	113,129.50	117,051.50	59,506.00	0.00	0.00	345,271.00	
Monash University									
LP190100403 Johnston, Prof David W	This project aims to explore the relationship between insecure work and mental health by applying advanced econometric methods to large survey and administrative datasets, and newly collected survey data. This project expects to provide causal policy-relevant estimates of how insecure work is affecting the wellbeing of workers and their families, and for whom the effects are most harmful. It also expects to inform on how poor mental health influences the types of jobs that people enter into. This should provide significant benefits, including evidence needed to improve existing workplace and employment programs, and evidence ensuring that assistance is efficiently targeted to those workers and industries with the greatest need.	29,737.50	61,672.50	66,060.00	34,125.00	0.00	0.00	191,595.00	BEYOND BLUE LIMITED
	National Interest Test Statement Mental illness constitutes a major burden on labour market productivity, with sickness absence, reduced work performance and long-term incapacity due to mental health problems costing Australia over $10 billion per year. Consequently, businesses and government organisations have begun to focus on the wellbeing of workers, and how workplaces can be better organised to improve wellbeing and productivity. The aim of this project is to provide new policy-relevant evidence on how insecure work and job insecurity influence the mental health and wellbeing of workers, their families, and the broader community. It should also aid in the identification of populations, industries and geographical areas that are, due to economic or labour market upheaval, at high-risk of health problems. Ultimately, this evidence should help in the development of targeted, cost-effective workplace and employment programs.								

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LP190100522 MacFarlane, Prof Douglas R	This project aims to develop and demonstrate new phase change materials to advance the technology of thermal energy storage. The project will focus on new materials that store thermal energy in the temperature range between 100 - 220°C that is optimal for distributed storage of solar and wind energy. The utility and economics of renewable energy sources are strongly limited by their intermittent nature and inexpensive means of storage are urgently required. Expected outcomes of this project include a practical technology, which can be implemented at household and industry level, providing cheap energy from zero-carbon sources. The project aims to provide significant benefits to energy users and support further development of renewables. **National Interest Test Statement** This project aims to contribute to Australia's national interest in several contexts, as follows: (i) Environmental: By providing inexpensive energy in the form of heat and electricity from zero-carbon sources, utilising renewable energy from the sun and wind, thereby reducing Australia's carbon emissions. (ii) Commercial: By development of an innovative energy storage technology that will allow Australian industries in the energy supply chain to be pioneers in the market of distributed solar thermal applications. (iii) Economic: The application of novel thermal energy storage technologies, based on phase change materials, will allow Australia to utilise larger quantity's of renewable energy sources such as wind and sun and will thereby help to reduce the price of these energy sources. (iv) Training: The project will provide PhD student and ECR training in the important area of sustainable energy technologies, and will generate a resource of new knowledge and functional materials for Australia.	73,959.00	147,918.00	133,982.00	60,023.00	0.00	0.00	415,882.00	ENERGY STORAGE PTY LTD
LP190100624 Davison, Prof Mark J	This project aims to clarify the appropriate basis for protecting geographical indications for wines in trade agreements and domestic legal systems. The project expects to generate new knowledge concerning the criteria, evidence and procedure that should be required to establish a geographical indication. Existing law risks misuse of this mechanism to unjustifiably protect domestic markets; the European Union is seeking protection for what appear to be grape varieties rather than geographical indications. Expected outcomes include evidence-based recommendations to government and industry. Project outcomes should benefit Australian economic interests by enhancing Australia’s ability to resist spurious geographical indication claims. **National Interest Test Statement** This project should deliver significant economic and commercial benefits for the Australian wine industry. International trade rules concerning geographical indications (GIs) are imprecise, which creates the risk that GIs could be misused for protectionist reasons. In current trade agreement negotiations, the EU is seeking GI protection for certain wines that would prevent Australian producers from labelling wines with the relevant grape variety. The project aims to articulate the legitimate grounds for GI protection in relation to wines. The networks that the project will build and the knowledge generated by it will facilitate a coordinated, long-term approach to resisting spurious GI claims that may hinder Australian producers' access to export markets and their ability to market products domestically.	25,000.00	50,000.00	25,000.00	0.00	0.00	0.00	100,000.00	AUSTRALIAN GRAPE AND WINE INCORPORATED

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LP190100755 Cook, Prof Perran L	This projects aims to better understand the factors controlling nutrient retention and removal within agricultural catchments and how climate and land use change will affect this. This project will combine novel approaches to investigate nutrient sources, removal and bioavailability with geochemical tracers to better understand nutrient flow and removal pathways. This new knowledge will be captured in state of the art modelling approaches that will help improve land management practices, leading to reduced nutrient loads and improved water quality in receiving waters such as the Gippsland Lakes.	51,493.50	162,493.50	241,500.00	203,000.00	142,500.00	70,000.00	870,987.00	DEPARTMENT OF ENVIRONMENT LAND WATER AND PLANNING, WEST GIPPSLAND CATCHMENT MANAGEMENT AUTHORITY, GIPPSLAND SOUTHERN RURAL WATER CORPORATION, GIPPSLAND WATER, AGRICULTURE VICTORIA SERVICES PTY LTD, STATE OF VICTORIA - ENVIRONMENT PROTECTION AUTHORITY
	National Interest Test Statement Nutrient pollution causes significant damage to aquatic ecosystems through algal blooms which cause loss of tourism revenue as well as ecological damage. Nutrients are predominantly derived from agriculture which support many communities and jobs. This project will help further understand the factors controlling nutrient export from catchments and capture this in models to help inform best management practice to reduce nutrient loads and reduce environmental impacts.								
	Monash University	180,190.00	422,084.00	466,542.00	297,148.00	142,500.00	70,000.00	1,578,464.00	
RMIT University									
LP190100175 Kasapis, Prof Stefan	This project aims to understand and control the properties and interactions of legume protein with other ingredients (e.g. whey protein and dietary fibre) to formulate healthy liquid foods with superior techno-functionality. This research should significantly broaden our understanding of the behaviour of legume protein-phospholipid complexes and their contribution to malodorous flavour development. The expected outcomes are protocols to prevent undesirable sensory characteristics in liquid foods. This should benefit the food industry by improving the sensory attributes of beverages enriched with legume protein, leading to the creation of novel, highly nutritious products with superior sensory attributes and long shelf-life.	51,800.00	103,600.00	103,600.00	51,800.00	0.00	0.00	310,800.00	SANITARIUM HEALTH & WELLBEING COMPANY
	National Interest Test Statement Consumer demand for healthy, plant-based protein continues to grow. However, the food industry faces significant scientific challenges in using plants such as legumes to create food products that are not only healthy and high in protein, but also tasty. The food sector cannot solve these challenges alone. RMIT researchers will collaborate with Sanitarium to address the scientific challenge involved in developing healthy, protein-rich food options such as breakfast drinks. This work will aid our understanding of the science involved in using plants as a protein source in food products. The technology developed through this collaboration will provide economic benefits to Australia via the food sector and support the food sector workforce. The availability of tasty and healthy legume-rich products may also help to reduce risks of lifestyle related-diseases for Australians, which in turn may lessen government health expenditure, which was around $18.7 billion in 2014-2015.								

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LP190100247 Kokanovic, Prof Renata	Mental disorders attract social stigma and those diagnosed are widely misunderstood. This project aims to collect and analyse accounts of people living with Borderline Personality Disorder (BPD) - mainly women - and perspectives of social support practitioners. The intended outcome is to provide a sophisticated understanding of BPD as a social phenomenon, develop sociological evidence based on lived experiences and generate Australian digital resources including narratives of BPD, creative outputs and practitioner perspectives. The anticipated goal of this project is to inform policy and community responses addressing stigma and marginalisation, and the improvement of social support for those affected by BPD.	88,750.00	190,250.00	195,000.00	93,500.00	0.00	0.00	567,500.00	DEPARTMENT OF HEALTH, MIND AUSTRALIA LIMITED, NATIONAL MENTAL HEALTH COMMISSION, MENTAL HEALTH VICTORIA LTD, NEAMI NATIONAL, EASTERN HEALTH, SANE AUSTRALIA, MELBOURNE HEALTH, PRIVATE MENTAL HEALTH CONSUMER CARER NETWORK (AUSTRALIA) LIMITED
	National Interest Test Statement This study brings several important sociocultural and policy benefits. It will develop innovative approaches to understanding the social context and lived experience of Borderline Personality Disorder (BPD), a label known for its significant stigma and social exclusion. This project will generate critical knowledge on the gendered and sociocultural contexts of lived experiences of the BPD label, constituting a pioneering evidence base to improve policy outcomes. It will develop internationally unparalleled digital resources and creative outputs to raise community awareness and improve social supports and participation. The project intends to fundamentally and positively transform representations and understandings of the BPD label; an approach potentially translatable to other complex mental health experiences associated with stigma and social marginalisation.								
	RMIT University	140,550.00	293,850.00	298,600.00	145,300.00	0.00	0.00	878,300.00	

Swinburne University of Technology

LP190100089 White, Prof Marcus	This seminal cross-disciplinary study aims to combine key ‘walk-quality’ urban design factors: pedestrian accessibility, slope, thermal comfort, pedestrian risk, and pollution, into a design decision platform to enable systematic evaluation of precincts and test ‘what-if’ future scenarios. With 60% of Australians not meeting recommended physical activity targets costing taxpayers billions of dollars annually, the project envisions development of acutely lacking spatio-temporal analysis and design tools to help prioritise urgently needed active transport infrastructure investment. Anticipated ‘walk-quality’ improvements to facilitating active journeys have vital foreseeable community benefits through increased incidental physical activity.	58,558.00	139,222.50	138,480.50	57,816.00	0.00	0.00	394,077.00	TRANSPORT ACCIDENT COMMISSION, GLEN EIRA CITY COUNCIL, MOVENDO PTY. LTD., CITY OF MARIBYRNONG, VICROADS
	National Interest Test Statement This project will address an urgent need for ‘walk-quality’ focused e-infrastructure tools for local governments, built environment professionals and researchers, as well as the broader community to make more informed, integrated and effective planning policy decisions. The iterative industry-tested development approach will ensure two-way knowledge transfer between the research team and Partner Organisations and promote strong uptake in industry. The expected insights gained will make a substantial contribution to empowering design and policy decision-makers to facilitate active modes of travel. The project provides a wide range of anticipated benefits including community health - through foreseeable increases in active travel (walking and cycling); economic - through improved efficiency of industry processes and smart prioritisation of active travel infrastructure investment; environmental - by improving ‘walk-quality’ and increasing low-emission transport, reducing car dependency; and social - through improving inclusive accessibility for people with mobility impairments, older adults, women and children								

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LP190100395 Chen, Prof Jinjun	Privacy protection in user data on cloud is now at risk throughout all stages of user information lifecycle facing significant challenges such as stage adaptive protection, across-system protection, privacy invasion tracing and prediction. Current approaches mainly focus on a specific case at certain stage, hence cannot address those challenges properly by considering all stages. This project aims to systematically investigate those challenges and expects to establish innovative research and solutions for enabling full lifecycle privacy protection on cloud. The project outcomes will help to safeguard Australian community in fast-growing online cyber world, and benefit to fast-growing privacy sensitive data hosting and applications on cloud.	75,000.00	150,000.00	150,000.00	75,000.00	0.00	0.00	450,000.00	BIG NETWORKS PTY LTD
	National Interest Test Statement This project, which focuses on full lifecycle data privacy protection for cloud data, is on important Australian national Cybersecurity priority because data privacy is a type of data security in Cybersecurity area. Privacy is now an increasingly worrying issue to the Australian community due to the increased volume of personal user data being hosted on cloud networks. Breach of user privacy such as identity leakage can cause serious economic, commercial, social and cultural consequences such as cyber bullying or fraud. As such, this project aims to develop full lifecycle privacy protection on the cloud. This will lead to a significant reduction or avoidance of privacy invasion events. In turn, this will bring significant economic, commercial, social and cultural benefits to Australian community, which otherwise can be lost by the breach of user privacy. This project will help to safeguard Australian community in fast-growing online cyber world.								
LP190100505 Juodkazis, Prof Saulius	Conventional primers contain a mechanically-sensitive primary explosive that is used to detonate the more stable propellant in a bullet. This project aims to address the health and environmental impacts of heavy metals in current primers by replacing them with benign, electrically or optically activated silicon-based materials. Modern semiconductor fabrication techniques will be used to develop safe and clean primers through cost-effective doping and deposition protocols. The expected outcomes of the project include a sovereign primer manufacturing capability for Australia. This will provide a significant strategic advantage and health benefits for law enforcement and defence personnel during live fire training and firing range exercises.	100,000.00	200,000.00	195,000.00	95,000.00	0.00	0.00	590,000.00	DEFENDTEX PTY LTD
	National Interest Test Statement This project will generate new knowledge and intellectual property in electronically- and optically-initiated primers. Outcomes of the project include the fabrication of novel primers for defence, law enforcement, and industrial applications, based on high volume, low cost semiconductor manufacturing techniques. Safe and clean primers will provide significant health benefits for law enforcement and defence personnel during live fire training and firing range exercises. A sovereign manufacturing capability for cost-effective primer products will reduce our dependence on overseas suppliers and provide Australia with an important strategic advantage. It will also open up new export opportunities for industry partner Defendtex in the US$19 Billion global ammunition market. This will in turn drive employment growth in the sector. This project will cement a strong collaborative relationship between Swinburne and Defendtex, supported by the training of PhD students and a postdoctoral researcher who will help to translate our fundamental scientific and technological discoveries into new products.								
	Swinburne University of Technology	233,558.00	489,222.50	483,480.50	227,816.00	0.00	0.00	1,434,077.00	

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The University of Melbourne									
LP190100079 Palaniswami, Prof Marimuthu	This Project aims to provide new digital asset management tools for city councils to improve city services by utilising new sensing and automated learning technologies for recognising, tracking and auditing of assets. Currently, there are no digital tools available to handle these services. This project proposes new multi-modal sensing and mapping of city asset techniques by building new multi-modal dictionary learning procedures. The new framework will recognise different conditions of city assets in real-time to make decisions. Expected outcomes of this Project include integration and easy access of assets with unique digital identities to help city councils, governments, and navigation services for real-time asset monitoring.	55,000.00	117,500.00	130,000.00	67,500.00	0.00	0.00	370,000.00	SENSEN NETWORKS GROUP PTY LTD
	National Interest Test Statement Australia's gross replacement value of assets is $438 billion, of which $47 billion value of assets are in poor or in very poor condition. Managing city assets (such as traffic signs, parking signs) is becoming difficult because of rapid development of cities and most cities lack a complete database of assets. No automated methods exist to integrate and track each asset. Currently councils deploy personnel to verify the asset every few weeks and update their database. The current practice of managing assets are prohibitively expensive due to personnel cost and time. This project will develop new tools to facilitate automated digitization and auditing of city assets. The outcomes would automate asset auditing in urban areas (cities), reduce time in auditing, reduce cost of auditing and eliminate subjective error. This will be the world's first automated asset auditing technology. This project contributes to an area of national concern: modelling and regulation of urban design, sensor technologies, real time data and spatial analysis (under Transport priority).								
LP190100090 Martin, A/Prof Gregory J	This project aims to provide new, science-based levers for optimising the industrial production of tailormade yeast extracts for food applications. Advanced biochemical and engineering methods will be used to develop new knowledge of the links between yeast growth conditions, cell biochemistry, processing and the flavour and texture profiles of yeast hydrolysates. This understanding will allow the properties of yeast hydrolysates to be accurately tuned during yeast production and processing. The resulting process improvements and innovations will increase the efficiency and quality of current yeast extract products and allow the development of new food products.	88,500.00	177,000.00	177,000.00	88,500.00	0.00	0.00	531,000.00	BEGA CHEESE LIMITED
	National Interest Test Statement Advanced food manufacturing is of growing importance to Australia's economy and there is an increasing demand for sustainably produced food ingredients and alternative proteins. Yeast biomass has untapped potential as a source of high-quality protein and other nutritional food ingredients. Bega, an Australian company, is a leading producer of yeast extract products that recognises the need to secure the supply of yeast biomass to meet increasing future demands. This project aims to support current and future yeast-based foods, by developing a core understanding of the biochemistry of the yeast production and processing. This will enable improved production of current yeast extract products and the development of new products for expansion into new markets. Australia has an established reputation as a producer of quality food, and close ties and proximity to massive and expanding markets in Asia. The outcomes of this project are expected to provide a technological boost that is required to take advantage of the Australia's strength as food producing nation.								

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LP190100104 Manzie, Prof Chris	This project aims to deliver fundamental knowledge by integrating the modelling and control with the design of next generation hypersonic platforms. In an era where Australia's national security reliance on geographic isolation and support from allied forces are being challenged, the research outcomes of this project will play an important role in understanding the capabilities of hypersonic systems. The project will also have significant spillover benefits into other complex system domains, where computational tools can be used to aid in design leading to high embedded-IP products for Australian industry. Furthermore, the proposal encompasses a strong research training aspect, with graduates exposed to leading edge industry and academia.	59,590.50	121,389.00	125,794.00	63,995.50	0.00	0.00	370,769.00	BAE SYSTEMS AUSTRALIA LIMITED
	National Interest Test Statement There are future operational challenges of defending Australia in an era where long-range precision strike capabilities that are now appearing in our region will have eroded Australia's security derived from geography. Consequently, the 2016 Australian Defence White Paper lists hypersonics as one of the key technological advances for our region. BAE Systems have designated this as a domain of strategic importance internally and are devoting significant effort to research and development in this domain. This proposal will assist BAE Systems in developing key competencies and tools for design and control of next-generation hypersonic vehicles and train the future workforce. The program will also develop fundamental insights into the contributing disciplines of control systems, optimisation and fluid dynamics. These have application beyond the hypersonic domain to the broader sector of advanced manufacturing, since the design of complex systems is becoming more heavily reliant on simulation tools to reduce prototyping effort and control systems are expected to account for variability in manufacturing or use.								
LP190100208 Zhang, A/Prof Lihai	Hailstorms cause billions of dollars of damage in Australia and hailstorm events are increasing in frequency with climate change. Robust cladding to resist extreme weather events is imperative for new and existing building stock. This project will develop technology to accurately assess the performance of aluminium cladding, glass facades and skylights under severe hailstorm events. The research outcomes will enable cost-effective design of robust cladding solutions and the evaluation of the performance of existing cladding. This will benefit asset managers, homeowners, the insurance industry and the building and construction industry, and help save billions of dollars of economic loss.	95,000.00	190,000.00	175,000.00	80,000.00	0.00	0.00	540,000.00	IAN BENNIE & ASSOCIATES PTY. LTD., ATLITE (AUSTRALIA) PTY LTD
	National Interest Test Statement Averting widespread damage to cladding and glazing on buildings caused by hailstorm will help save billions of dollars in economic loss. The Australian cladding and window manufacturing industries will benefit from access to better testing services for severe hailstorms, increased export opportunities for better performing products and gaining a competitive advantage in the global market. Australia’s $190B building construction industry will benefit from access to cost-effective solutions and a methodology to assess the plethora of products constantly entering the market with unverified performance. Building asset owners will benefit from lower cost maintenance due to more robust cladding and glazing and the ability to verify the performance of existing installations. The burden of hailstorm damage on Australia’s insurance industry will be significantly lowered through better performing products.								
LP190100393 MacFarlane, Dr Elizabeth	This project aims to document, preserve and investigate a new history of Australian comics and graphic novels created 1980 to 2020. This period represents a significant shift in the thematic content and material production of comics. In tracing the development of technologies and communities, this project expects to generate new knowledge about narrative innovations comics use to reflect diverse national identities and cultures in Australian society. By consolidating and providing public access to a wealth of contemporary Australian comics through a website and public programs, this project should feed the future of Australian comics industry and scholarship, providing significant benefit to Australian artists, readers, and the public.	45,076.50	84,583.50	70,180.50	30,673.50	0.00	0.00	230,514.00	NATIONAL LIBRARY OF AUSTRALIA, AUSTRALIA COUNCIL, CRAIG WALKER PTY LTD

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	National Interest Test Statement The project will maximise social and cultural benefits to Australia by consolidating our national contribution to an arts medium for a global audience. The project will expand and diversify our national collection and acquisition strategies. The project will promote comics and graphic novels to the nation's primary government advisory board for Arts funding. Building a sustainable and beautifully designed website to consolidate a picture of contemporary Australian comics will ensure the project's dissemination and outcomes extend well beyond the research sector. The project will benefit Australian artists, by increasing commercial viability of emerging and established comics creators, and laying the groundwork for the artists of the future. The project will also benefit the Australian reading public, by showcasing a medium that is both uniquely loved and uniquely overlooked. In Australian comics, a global audience will find a new way of looking at Australian life from 1980 to 2020.								
LP190100536 Farrell, Dr Claire	Cities around the world are investing hundreds of millions of dollars in urban green spaces. This project aims to improve the quality of low input public landscapes and make our cities more liveable. Typical low maintenance plantings have low diversity, visual appeal and function. This project expects to develop a novel low-cost and resilient approach to urban greening by utilising Australian shrublands as templates for woody meadows. Through interdisciplinary research and collaborations with eight Partner Organisations, the expected outcomes include knowledge and skill sharing for widespread adoption of resilient, management-friendly woody meadows to enhance and expand urban green spaces in Australia and around the world.	89,016.00	152,551.50	130,399.00	162,233.50	95,370.00	0.00	629,570.00	CITY OF GREATER DANDENONG, HUME CITY COUNCIL , MORELAND CITY COUNCIL, CITY WEST WATER CORPORATION, WYNDHAM CITY COUNCIL, CITY OF WHITTLESEA, BOROONDARA CITY COUNCIL, VICROADS
	National Interest Test Statement By improving the appearance and function of public landscapes with novel, low-cost and resilient woody meadow plantings this project provides many economic, environmental and social benefits to the Australian community. These plantings will be installed along road and rail infrastructure and in parks and reserves and contribute to improving biodiversity, cooling cities, reducing stormwater runoff and increasing nature connectedness and physical activity. The Partner Organisations have an important role in shaping urban landscapes and this project will help them to build landscapes which have greater diversity and aesthetic appeal, with reduced maintenance and implementation costs. The diversity of Partner Organisations ensures implementation of woody meadows across many sites to demonstrate their value, applicability and success. Project outcomes will be translated in an 'installation and maintenance guide' to ensure implementation beyond these Partner Organisations into the future. Therefore, this research proposal provides on-going value to the Australian community beyond the 4-year project.								
	The University of Melbourne	432,183.00	843,024.00	808,373.50	492,902.50	95,370.00	0.00	2,671,853.00	
	Victoria	1,159,740.00	2,400,030.00	2,421,021.00	1,348,601.00	237,870.00	70,000.00	7,637,262.00	

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Western Australia									
Curtin University									
LP190100130 Johnson, A/Prof Stuart K	Lupin seed is a major Australian high protein legume crop, undervalued at only ~$200 tonne due to its use as an animal feed. However this project aims to add value to the crop by designing a scalable food-grade and commercialisable technology to purify the protein gamma-conglutin from lupin seed waste as a nutraceutical for human blood glucose control. The process optimisation and mechanism of action for gamma-conglutin will be informed by proteomic analysis and cellular studies. From the project farmers may benefit through adding a premium to their crop value, a new gamma-conglutin purification technology will be available for processors to commercialise and consumers will have a natural product to help their blood glucose control.	54,229.00	104,492.50	102,423.00	52,159.50	0.00	0.00	313,304.00	THE GLYCEMIC LUPIN COMPANY PTY LTD
	National Interest Test Statement Australia is the world's largest lupin seed producer and it is one of our largest legume crops. However lupin is undervalued as sold as animal feed and thus does not attract a premium as human food. Lupin has many advantages for the Australian agri-food system being an ideal rotation crop in the Western Australian wheat belt, where its nitrogen fixation assists with soil quality. Due to its current low value, lupin has lost some favour with farmers, therefore it is vital that value-added human nutrition uses are found. Lupins are high in protein and human trials, though limited, have indicated that one protein, gamma-conglutin may help in control of blood glucose. The design of a commercialisable process for the purification of gamma-conglutin from lupin proposed in this study has potential for wide ranging benefits such as increased financial returns on the crop, stimulating increased planting and follow-on environmental benefits. The proposed technology may lead to highly profitable new Australian manufacturing opportunities and the quality-of-life of consumers with high blood glucose may be assisted.								
LP190100297 Buckley, Prof Craig E	This project aims to develop a new method of producing, storing, and exporting green hydrogen using Australian resources. Sodium borohydride will be produced from borax using renewable energy and exported internationally to countries that desire hydrogen from renewable sources to replace fossil fuels. Green hydrogen will be released from sodium borohydride by adding water. The spent material will then be shipped back to Australia for recycling back to sodium borohydride, creating a closed-loop energy cycle using renewable energy. This will create a new export industry in Australia by expanding current mining expertise whilst harnessing our wealth of renewable energy to potentially deliver billions of dollars of revenue.	98,288.50	199,077.00	194,077.00	93,288.50	0.00	0.00	584,731.00	WA HYDROGEN PTY LTD
	National Interest Test Statement This project will positively impact Australia on multiple fronts, the most important being economic and commercial. A new export industry is to be developed with renewable energy at its core. With global requirements to reduce the carbon footprint, Australia can provide green energy to those who need it most. Japan and South Korea have already expressed their desire to implement a hydrogen economy, while Australia has the required solar energy and natural resources to supply them with hydrogen. Exporting renewable energy is an expensive process as electrical batteries are heavy and expensive, whilst energy dense liquids and gases are potentially difficult to handle, costly, or require special treatment on delivery. This project will export green hydrogen as a solid, reducing costs, increasing safety and simplifying overseas processing. As this is an emerging technology and industry, Australia will also benefit socially due to increased employment opportunities and national revenue.								
	Curtin University	152,517.50	303,569.50	296,500.00	145,448.00	0.00	0.00	898,035.00	

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The University of Notre Dame Australia									
LP190100194 Wallis, Dr Lynley A	The Laura Sandstone Basin of Cape York Peninsula hosts one of the richest bodies of rock art in Australia and the world. It documents the life-ways of generations of Aboriginal Australians from their original settlement, through major environmental changes, to European invasion. This vast area, much of which is now jointly managed as National Parks by Traditional Owners, remains virtually unexplored archaeologically. This project aims to record this unique rock art so that its testimony remains for future generations. This will provide a framework for its sustainable management and findings will have profound implications for our understandings of the cultural behaviour and dispersal of the earliest modern humans to colonise Australia.	130,000.00	275,000.00	290,000.00	290,000.00	251,000.00	106,000.00	1,342,000.00	BALNGGARRAWARRA ABORIGINAL CORPORATION, SOUTH CAPE YORK CATCHMENTS INC., BUUBU GUJIN ABORIGINAL CORPORATION, CAPE MELVILLE FLINDERS & HOWICK ISLANDS ABORIGINAL CORPORATION, DEPARTMENT OF ENVIRONMENT AND SCIENCE, SOUTH CAPE YORK CATCHMENTS INC.-LAURA INDIGENOUS LAND AND SEA RANGERS, WALLIS HERITAGE CONSULTING, WAARNTHUURR-IIN ABORIGINAL CORPORATION
	National Interest Test Statement This project aims to produce data of national scientific and social significance that will assist our understanding of the nature of Aboriginal settlement in northeastern Australia and the role of rock art in this process. This project aims to cement Australia as a world leader in rock art analysis and thus will have cultural benefits to the nation. This project intends to initiate and facilitate the development of a long-term strategic alliance between Aboriginal Traditional Owners, Ranger groups, researchers, and land managers. This collaborative partnership will greatly enhance and improve the promotion, conservation and management of cultural heritage in eastern Cape York Peninsula, thereby achieving long lasting national economic, environmental and social benefits. As part of the wider process of cross-cultural engagement and managing traditional lands through joint management and Ranger programs, the project aims to provide genuine economic, professional and social opportunities and benefits to Aboriginal participants, thereby promoting community well-being in a geographically remote area of Australia.								
	The University of Notre Dame Australia	130,000.00	275,000.00	290,000.00	290,000.00	251,000.00	106,000.00	1,342,000.00	
The University of Western Australia									
LP190100146 Jessell, Prof Mark W	This project will deliver a new quantitative and integrated exploratory framework for the mineral industry in Australia's frontier sedimentary basins by integrating the latest advances in laboratory experimental tectonics with thermo-mechanical numerical, surface process and geophysical modelling. The project will use northern Australian basins as a natural laboratory to address the fundamental processes involved in the development of sedimentary ore systems. The project will investigate how they can be detected by modern exploration techniques using a multidisciplinary approach with a team of experts with backgrounds in mineral and petroleum systems.	150,000.00	300,000.00	300,000.00	227,500.00	77,500.00	0.00	1,055,000.00	CSIRO, BHP BILLITON LIMITED, INDEPENDENCE GROUP NL, GEOLOGICAL SURVEY OF WESTERN AUSTRALIA , ANGLO AMERICAN, MINERALS RESEARCH INSTITUTE OF WESTERN AUSTRALIA

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	National Interest Test Statement								
	This project will contribute to the resources sector by providing a systematic study of the key constraints on sedimentary basin evolution in a minerals context. This will help guide future minerals exploration programs. The specific study areas we will use as test cases represent the single largest under-explored region of Australia and all data collected will feed into the publicly available database to support mineral explorers in the region. This project will also provide training opportunities for the next generation of geoscientists. The research team has a strong and extensive history of training future multi-disciplinary geoscientists that can bridge structural geology, tectonics, geophysical interpretation and geodynamics, skills which will only become more important for future researchers and mineral explorers.								
The University of Western Australia		150,000.00	300,000.00	300,000.00	227,500.00	77,500.00	0.00	1,055,000.00	
Western Australia		432,517.50	878,569.50	886,500.00	662,948.00	328,500.00	106,000.00	3,295,035.00	
		3,748,081.00	**7,756,459.50**	**7,813,056.00**	**4,393,099.00**	**800,718.50**	**212,297.00**	**24,723,711.00**	

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