

Minister's Approval for Linkage Projects 2021 Round 1 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)		Total (\$)	Partner Organisation(s)			
		2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	(Column 9)	(Column 10)			
(Columns 1 and 2)		(Column 4)			(Column 5)		(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)
Australian Capital Territory											
The Australian National University											
LP210100092	Noise-free Cryogenic Wavefront Sensing	120,000.00	118,000.00	0.00	0.00	0.00	238,000.00	GIANT MAGELLAN TELESCOPE ORGANIZATION			
Sharp, Prof Robert	This project aims to optimise the prototype adaptive optics technology for the Giant Magellan Telescope (GMT) by leveraging past investment in adaptive optics instrumentation and shortwave infrared detector systems. This project expects to generate significant improvements in GMT performance, with ten times greater image resolution than the Hubble Space Telescope and current estimates of >90% sky coverage, compared with ~50% coverage for current technology. Expected outcomes of this project include the development of a highly trained workforce and continued international collaboration in the field of high-technology sensor systems. This contribution to the GMT will provide significant benefits—it will change the way we view the Universe.										
National Interest Test Statement											
High-speed and low-noise infrared cameras are essential to satellite laser communication systems (which are key to a faster and more secure internet) and accurate tracking of space debris (which is essential to our growing dependence on satellites and space systems). Infrared cameras are also critical tools for modern satellite Imaging systems used in research, defence and everyday applications such as food crop monitoring, mineralogical surveying and bushfire hazard management. The next-generation speed and sensitivity of the camera system we develop will make possible lower-cost and smaller satellites systems capable of addressing national priorities within Australia’s space industry, and enable our industry and government partners to realise market growth for home-grown, high-performance, low-cost and lightweight infrared cameras. This project builds on Australia’s global leadership in high-performance infrared sensors and will boost Australia’s competitive advantage in the field of Adaptive Optics.											
The Australian National University		120,000.00	118,000.00	0.00	0.00	0.00	238,000.00				
Australian Capital Territory		120,000.00	118,000.00	0.00	0.00	0.00	238,000.00				

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New South Wales								
Australian Catholic University								
LP210100304	Deadly Futures:Enabling Indigenous Children's Literacy, Numeracy, Wellbeing	174,000.00	148,000.00	154,000.00	148,000.00	153,000.00	777,000.00	WONNARUA NATION ABORIGINAL CORPORATION
Craven, Prof Rhonda G	<p>This project aims to test the effectiveness of new literacy, numeracy and wellbeing interventions using powerful interdisciplinary approaches. The project expects to generate new knowledge about enabling Indigenous students to have deadly futures by enhancing literacy, numeracy and wellbeing, capitalising on research-derived interventions and the wisdom of Indigenous communities. Expected outcomes include salient intervention and advances in Indigenous education. Benefits encompass identifying effective intervention and drivers that enhance Indigenous students' literacy, numeracy, wellbeing, and adaptive motivation, and working effectively in genuine partnership with Indigenous community to address a community-identified need.</p> <p>National Interest Test Statement</p> <p>Literacy, numeracy and adaptive motivations such as feeling good about one's self and abilities are essential for achieving the most out of a person's schooling and life. However, little is known about optimising literacy, numeracy and adaptive motivations to help Indigenous students achieve their true potential. This project tests the effectiveness of interdisciplinary-derived literacy, numeracy and wellbeing interventions for regional and urban Indigenous students. The project will work in genuine partnership with Indigenous communities to identify drivers and provide interventions that will enhance Indigenous students' literacy, numeracy, wellbeing and adaptive motivation. The project is expected to address community-identified needs, advance Indigenous education and add materially to the socio-economic fabric of Indigenous Australian communities.</p>							
	Australian Catholic University	174,000.00	148,000.00	154,000.00	148,000.00	153,000.00	777,000.00	
Macquarie University								
LP210100337	Robust and Scalable Autonomous Landing for Drones	150,292.00	146,314.00	162,987.00	0.00	0.00	459,593.00	SKYY NETWORK COMPANY PTY LTD
Han, Prof Richard Y	<p>The aim of this project is to develop a transformative robust and scalable autonomous landing system for drones. This is the critical missing technology needed to unleash exponential growth in a potentially enormous drone delivery industry by enabling a multitude of applications to deliver goods and supplies via drones to a wide range of destinations in Australia and the world in a timely, flexible and accurate manner. Such an autonomous landing solution would revolutionise drone technology, and propel Australia to the forefront of technology innovation. This project would benefit not only large scale delivery by drone in urban and suburban areas of Australia but also long distance delivery via drone to remote areas of Australia.</p> <p>National Interest Test Statement</p> <p>The development of a pioneering technological capability to autonomously land drones without human assistance would provide numerous significant benefits to Australia. First, Australia's transportation sector would benefit since rapid growth of a potentially enormous drone delivery industry, forecast in a decade to be hundreds of billions of dollars worldwide, would be stimulated in Australia. In addition, a wide range of consumers and businesses would benefit from autonomous landing technology, which would enable substantially more rapid and convenient delivery of goods and services via drones compared to standard land-based transport systems. The project would further benefit the reputation of Australia as a leader in global technological innovation, and thereby attract the highest technically skilled talent to Australia both in its universities and industry.</p>							
	Macquarie University	150,292.00	146,314.00	162,987.00	0.00	0.00	459,593.00	

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Southern Cross University								
LP210100177	Strengthening Relationships for Young People in Residential Care	137,964.00	158,063.00	133,542.00	0.00	0.00	429,569.00	AUSTRALIAN CHILDHOOD FOUNDATION
McPherson, A/Prof Lynne M	Young people in residential care face major challenges in forming positive relationships, many having experienced adults as a source of threat rather than safety. This project aims to investigate practices within therapeutic residential care that enable or limit young people's identity formation, positive social connections, safety and wellbeing. This research will generate nuanced knowledge informing interpersonal and institutional change. Expected outcomes include improved approaches to therapeutic care and to methods for enabling the participation of young people in care in matters that may change their life trajectory on exiting care. Expected benefits include more responsive policies and frameworks for practice.							
	National Interest Test Statement							
	The life trajectory for young people in residential care is alarming, with care leavers far more likely than their non-care experienced peers to have poor educational outcomes, significant mental health and substance abuse problems, and risk of unemployment and criminal justice system involvement. Seeking to address such poor outcomes, therapeutic residential care (TRC) aims to create positive, safe, healing relationships and experiences for young people who have experienced complex trauma. The NSW government has made a significant public investment in TRC, estimated at \$490,000 per young person in residential care annually. This research aims to develop new knowledge about the interpersonal and institutional practices that enable or constrain relational care and the impact these have on young people's identity formation, positive social connections, wellbeing and safety.							
	Southern Cross University	137,964.00	158,063.00	133,542.00	0.00	0.00	429,569.00	
The University of New South Wales								
LP210100090	Missing girls: From childhood runaways to criminalised women	64,759.00	85,232.00	54,316.00	0.00	0.00	204,307.00	BARNARDOS AUSTRALIA, TASKFORCE COMMUNITY AGENCY INC
Evans, Dr Phillipa	This study examines the link between girls declared 'missing' and their trajectory into the criminal justice system, expanding the Australian knowledge base along with providing a clear, tangible practice framework to prevent the drift into youth and adult criminal justice systems. By addressing concerns of practitioners and policy makers this significant research increases the visibility of a marginalised groups, exploring individual and systemic impacts of missing girls entering the criminal justice and welfare systems. Findings of this research will detail opportunities for early intervention for service providers in addition to rich empirical data to better inform policy makers and service developers targeting at risk young people.							
	National Interest Test Statement							
	Girls who 'go missing' in adolescence are amongst the most vulnerable young people in Australia. International literature has identified links between girls going missing or running away and later contact with the criminal justice system, often presenting with high degrees of trauma and victimisation. As the first Australian study of its kind, this study will examine the nature and extent of girls declared missing will be examined along with their pathway into the criminal justice system. Findings of this research will detail opportunities for early intervention for service providers in addition to rich empirical data to better inform policy makers and service developers to prevent the drift of vulnerable girls into youth and adult criminal justice systems.							

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LP210100209 Laws, Dr Kevin J	New Lead-Free Brass Solutions for Drinking Water Applications The aim of this Linkage Project is to provide viable material solutions to address the health problem of Lead-contamination in drinking water arising from Leaded-brass plumbing products and the impact Lead-removal from brass will have on the brass industry. In order to achieve this, this project engages leading multidisciplinary researchers along with Australian and international industry partners from across the brass industry supply and sales network. This project seeks to identify and harness the key material-product attributes required to develop and implement new, lead-free alloy alternatives that meet health-compliance, production and commercial viability, that offer benefits across the industry network and health benefits to society.	142,000.00	148,000.00	154,000.00	0.00	0.00	444,000.00	ADVANCED ALLOY HOLDINGS PTY LTD, LCL PTY LTD, ENWARE AUSTRALIA PTY. LIMITED, GALVIN ENGINEERING PTY LTD, ALMAG S.P.A.
	National Interest Test Statement Lead contamination in Australia's drinking water arising from the use of Lead in Brass plumbing products is a widespread public health issue. Australia's NHMRC highlights that "lead is a cumulative poison that can affect the central nervous system, particularly in infants and children, and can adversely affect intelligence" among other known health issues. In 2018, Australia's Department of Health issued guidance of "Flushing water taps used for drinking and cooking for about 30 seconds" to minimise Lead exposure. While regulations are expected to ban the use of Lead in Brass plumbing components, manufacturing issues introduced by the removal of Lead from Brass may deem components and the industry itself economically unviable. This Linkage Project seeks to solve the problem of lead-contamination in drinking water by developing new lead-free alloys which can be manufactured using existing Australian supply chain technologies for brass plumbing products. Their economic benefits will see them widely adopted as the century-old brass industry adapts in the interest of major health and environmental benefit.							
LP210100300 Letnic, Prof Mike I	Are kangaroos jeopardizing conservation outcomes? There is concern that grazing by over-abundant kangaroos is jeopardising the goals of arid conservation reserves, but there is little evidence about the extent of their impacts. The goal of this proposal is to quantify kangaroos' grazing effects on biodiversity within arid conservation reserves. The results will provide a whole ecosystem understanding of how overgrazing by kangaroos influences the biodiversity conservation value of the vast landscapes of arid Australia. Managers of many conservation reserves, including our project partners, and policy-makers need the information that our experiments will provide to inform the development of strategies to optimise biodiversity conservation and manage the impacts of kangaroos.	191,938.00	102,949.00	139,229.00	0.00	0.00	434,116.00	NATURE FOUNDATION LIMITED, BUSH HERITAGE AUSTRALIA
	National Interest Test Statement There is widespread concern that overabundance of kangaroos has caused significant environmental change in Australia through overgrazing including in conservation reserves. However, there is less appreciation that the objectives of conservation reserves may be jeopardized by their being too many kangaroos. The goal of this proposal is to understand how grazing by kangaroos influences the biodiversity value of arid conservation reserves. The results will provide a whole of ecosystem understanding of how overgrazing by kangaroos influences the biodiversity conservation value of the vast landscapes of arid Australia. The findings will benefit our partner organizations and managers of conservation and pastoral lands throughout semi-arid and arid Australia who require better understanding of the impacts of kangaroo grazing to inform their management practices.							
LP210100426 Conibeer, Prof Gavin J	Fabrication of silicon solar cells in a Lunar-like vacuum environment In-situ power generation on the Moon is essential for the advancement of space exploration and habitation. At present this involves transportation of solar cells to the Moon. This proposal aims to pave the way for manufacture of solar cells on the Moon from Lunar materials. Utilising the future extraction and purification of silicon, abundant in lunar regolith, the project will focus on fabrication of silicon solar cells. This will provide power for: water mining, oxygen extraction, vehicles and habitats on the Moon and delivery of materials to Low Earth Orbit. The proposed research aims to develop solar cells that can be manufactured on the Moon, using materials abundant there, and techniques exploiting the natural vacuum of space.	148,462.00	131,488.00	137,279.00	0.00	0.00	417,229.00	EXTRATERRESTRIAL POWER PTY LTD

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	National Interest Test Statement Expansion of commercial and exploratory activity in space will require much greater activity on the Moon. This activity will require a rapidly growing access to solar power. This project will provide the knowledge and a platform suitable for manufacturing silicon solar cells from silicon and other materials sourced locally on the Moon. The research contributes to Australia's national interest, the commercial opportunities it will offer to Australasian companies in Lunar missions and manufacture of Lunar power systems, which will enable a more rapid deployment of Lunar operations and further growth of commercial opportunities on the Moon and in space. The project will directly contribute to the high quality training of PhD students and postdocs and will result in many high impact journal publications and high quality conference papers as well as a number of patents in innovative space-like based manufacturing. These commercial opportunities will generate longer term benefit for Australians in improved space based communication and data handling services as well as several other longer term opportunities.							
LP210100447	Advanced metallisation for III-V Photovoltaic Solar Power Systems This project aims to augment the overall electrical efficiency of concentrator photovoltaic solar systems that provide large-scale generation of cheap, clean electricity. Existing concentrator solar cells are highly efficient (>40%) but their performance is hampered by thick front-metal contacts that shade the cell. The project is expected to develop a new concentrator solar cell metalisation and insulation technology. The benefit of the project will be a direct increase in the system efficiency and simplified manufacturing of the concentrator solar receiver, which in turn reduces the cost of the concentrator power plant constructed by our Australian project partner RayGen Resources Pty Ltd.	185,833.00	190,998.00	83,654.00	0.00	0.00	460,485.00	RAYGEN RESOURCES PTY. LTD.
Ekins-Daukes, A/Prof Nicholas J	National Interest Test Statement This project aims to lower the cost of concentrated solar energy systems. The national benefit is several-fold: maintaining Australia's reputation as a leader in photovoltaic R&D and leveraging the present investment in the Australian National Fabrication Facility to improve the competitiveness of the Australian solar energy manufacturing landscape. The proposed technology is well suited for large scale power production, can assist with hydrogen production, supply process heat and power for industry, and it supplies electricity to a wide range of grid applications including in remote regions of Australia. Additionally, the glass and steel solar collectors are well suited to regional manufacturing and have significant export potential. This technology would have potential to enable Australian industry to extract and add value to our mineral resources whilst transitioning energy systems required for the mining sector away from a dependence on imported diesel to instead make use of Australia's abundance of solar energy.							
	The University of New South Wales	732,992.00	658,667.00	568,478.00	0.00	0.00	1,960,137.00	
The University of Newcastle								
LP210100192	Engineered clay-polysaccharide composites for efficient nutrient delivery Nitrogen (N) nutrient use efficiency of most arable crops in Australian soils is low, leading to excessive application of this nutrient. The low N use efficiency is attributed to its loss through leaching and gaseous emission, which contributes to both economic burden of the farming community and also results in environmental degradation. This project aims to work with clay industries to develop fertiliser products with controlled release characteristics to increase N use efficiency and farm productivity. It will also create new market opportunities for the mining industry for the use of clays and create novel materials for delivery of nutrients and moisture for the agrochemical industry resulting in the creation of marketing opportunities.	120,951.00	137,674.00	130,384.00	0.00	0.00	389,009.00	ANDROMEDA METALS LIMITED, MINOTAUR EXPLORATION LTD
Bolan, Prof Nanthi S	National Interest Test Statement Improved understanding of interactions between natural clays and nutrients will pave way for producing slow release fertiliser products to overcome low nutrient use efficiency in Australian soils. The socioeconomic and environmental benefits of novel fertiliser products with low nutrient losses to environment will help ensure an economically sustainable future for all including the farming community that utilise these products to increase crop productivity and farm profitability. As around 57% of Australia's land area is used for agriculture currently supporting 1.6million jobs and contributing 3% (about \$50 billion) to GDP, the industry sector in Australia will stand to benefit from new, environment-friendly and sustainable fertiliser products. This project provides research training and mentoring to early career scientists and PhD students in a novel area of fertiliser technology directly impacting Australian farming community. This research aligns with Science and Research Priority of "Food" and addresses the Practical Research Challenge of "Enhanced food production through novel technologies".							

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LP210100436	Nanoscale heating towards high efficient nitrogen reduction reduction	130,000.00	130,000.00	130,000.00	130,000.00	0.00	520,000.00	MINOTAUR EXPLORATION LTD, ANDROMEDA METALS LIMITED
Yi, A/Prof Jiabao	<p>This project aims to develop nanoscale heating technique using AC magnetic field for efficient synthesis of ammonia, widely used for fertiliser and having potential for hydrogen storage. This project is to introduce nanoscale heating concept by heating catalyst only but not solution in electrochemical catalysis to achieve high catalytic activity. Expected outcome is the creation of low cost catalysts having high selectivity and formation rate for ammonia production. This unique technology has the potential to replace current ammonia production based on Haber-Bosch process, which consumes 2% of world energy and contributes 3% of overall CO2 emission. The project provides opportunities for new industries that will benefit Australian economy.</p> <p>National Interest Test Statement</p> <p>Nanoscale heating is a recently introduced conception using a small AC magnetic field to heat magnetic catalyst to achieve extremely high efficient catalytic performance. This project is to develop halloysite/magnetic composite for high efficient production of ammonia using nanoscale heating technique, 90% of which used for the production of fertiliser and having the potential for hydrogen storage. By studying the synergy effect of nanoparticles distribution, magnetism, nanoscale heating and electrochemical performance for ammonia synthesis and understanding the mechanism, low cost and high efficient catalysts for electrochemical synthesis of ammonia with high Faraday efficient (selectivity) and formation rate are expected to be developed. Nanoscale heating using AC magnetic field for efficient ammonia synthesis is currently not applied in Australia. The project will critically influence the research on the synthesis of ammonia in Australia. The project will have strong impact on the agriculture and renewable energy industries and offer economic benefits for Australia.</p>							
	The University of Newcastle	250,951.00	267,674.00	260,384.00	130,000.00	0.00	909,009.00	
The University of Sydney								
LP210100099	Breakthrough technologies in implantable bionics	264,173.00	269,448.00	274,834.00	280,332.00	0.00	1,088,787.00	COCHLEAR LIMITED
Suaning, Prof Gregg J	<p>This project aims to introduce revolutionary changes in implantable bionics via miniaturisation, automation and improved reliability and generating new knowledge by leveraging recent advances in laser processes. Expected outcomes include innovative hybrid thin-film/thick-film electrode arrays with more channels and charge-carrying capacity for neuromodulation; novel glass interfaces that facilitate deeply-miniaturised hermetic packages; and failure analysis to ensure study aims result in new processes that are as or more reliable than the current state-of-the-art. This work will create new and novel manufacturing processes, and trains the next generation of innovators equipped with the tools to advance implantable bionics into the future.</p> <p>National Interest Test Statement</p> <p>This project aims to radically enhance the manufacture of implantable bionics, yielding new capabilities for miniaturisation, automation and reliability. Exploiting recent advances in pulse-laser technology to produce micro- and nano-machined components, it will bring labour-intensive manufacturing methods into an era of automation and facilitate miniaturisation at a scale not previously possible owing to the limitations of human dexterity. This research will develop a novel approach to hermetic sealing of bionic devices through ultra-short-pulse laser welding to join a range of materials, producing miniaturised implant packaging for protecting electronics from moisture and ions. While of benefit to the implantable bionics field as a whole, the work addresses challenges common to many other industries that share the need for extraordinary reliability, miniaturisation and hermetic sealing. With applications from satellite and automotive technologies, to electronics such as mobile phones, the project is of broad benefit to Australian industry and end consumers.</p>							

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LP210100173	New digital deep-time exploration tools for a low-emissions economy	125,377.00	148,669.00	141,630.00	0.00	0.00	415,676.00	LITHODAT PTY. LTD.
Muller, Prof Dietmar	<p>Demand for critical minerals will soar as renewable energy generation increases, but exploration companies currently cannot take full advantage of available exploration data in an Earth evolution context. This project will generate new knowledge in big and complex geodata analysis using an innovative data mining approach. It will enable Lithodat, a small enterprise, to perform cloud-based plate tectonic reconstruction, visualisation and spatio-temporal analysis of geodata for resource exploration. The outcomes include an enhanced capacity to generate ore prospectivity maps and an improved understanding of their tectonic, geochemical, and geophysical signatures, benefiting Lithodat and their clients in the search for new mineral deposits.</p> <p>National Interest Test Statement</p> <p>As demand for critical metals essential for a low-emissions economy is increasing, exploration for resources needs to be supported with emerging technologies to better understand mineral and Earth system processes. This project will enable industry explorers to reconstruct exploration data using plate reconstructions through a web interface hosted by Lithodat, our startup industry partner. End users will be able to assess where and when ore deposits formed through geological time, aided by a multitude of geological, geochemical and geophysical data and cloud-based machine learning. These new tools, enabled by two decades of Australian software development, will establish an unprecedented ability to visualise and analyse Earth's geological evolution with the same ease as the public can now access satellite images via Google Earth. These new exploration tools will help reveal new information about the structure of the crust and its mineral resources via a low-cost investment that is at least 2 orders of magnitude smaller than exploration costs using traditional methods.</p>							
LP210100272	Promoting active travel and public transport for a post-pandemic world	89,572.00	95,405.00	97,321.00	0.00	0.00	282,298.00	TRANSPORT FOR NSW
Nelson, Prof John	<p>In many major cities, COVID-19 stimulated the provision of open streets, pop up bike lanes and widened pedestrian access, prompting unprecedented increases cycling and walking. While this type of infrastructure has always been supported by urban planners and designers, the pandemic has served as a vital inflection point, enabling cities to pursue long-term sustainable transport initiatives, including investment in Active Travel (AT). There is an opportunity to promote AT as part of an integrated transport strategy, and to develop tools for the robust evaluation of AT impacts to inform future investment strategies. This proposal will provide our partner organisation Transport for New South Wales (with the knowledge required to achieve this.</p> <p>National Interest Test Statement</p> <p>Australians need integrated urban transport systems that facilitate healthy, active travel. Improvements to key infrastructure are critical, but we lack the evidence to direct planning towards high-impact interventions. The COVID-19 pandemic has caused unforeseen changes in travel, locally and globally, including the rapid adoption of active transport infrastructure that maintains physical distance, such as pop-up cycleways and shared pathways. This project will garner international insights from these interventions, boosted with Australian case-studies and surveys. It will capture the travel habits and health behaviours of users and non-users of active travel to accurately estimate economic, health and environmental benefits. This project will leverage the short-term pandemic disruptions to build evidence that will enable long-term, sustainable transport. Recommendations from this research will guide efficient investment in key public infrastructure that can reduce the transmission of infectious disease, improve the mental health and cardiovascular wellness of Australians and further develop sustainable cities.</p>							

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LP210100387 Kramer, Dr Elisabeth A	Socio-cultural Factors and the Use of Therapeutic Opioids in Indonesia This project aims to determine how legal, policy and socio-cultural factors influence the use of therapeutic opioids in Indonesia. The project expects to generate a nuanced understanding of the impact of non-medical considerations in contested areas of health policy through its multidisciplinary and multi-scalar approach. We expect outcomes to include a robust model of influences on decision-making that can be applied in Indonesia and adapted for use in other national contexts. This should provide significant benefits, including an innovative training program to empower doctors and pharmacists to make evidence-based decisions about the potential risks and benefits, both medical and social, of opioid-based treatment options. National Interest Test Statement This project contributes to Science and Research Priority 9. It addresses the challenge of developing 'better models of health care and services that improve outcomes' by developing a model for understanding decision-making in contested areas of health policy. While focused on Indonesia, its outputs will be highly salient in Australia, particularly in the analysis of the interactions of migrant communities with the Australian health system. In addition, the project's findings will assist Australian organisations with an interest in patient rights and pain management in the Asia-Pacific to maximise their impact in our region. The project also aligns with Australia's overseas development assistance priorities. Health is a key concern for the Department of Foreign Affairs and Trading (DFAT). Indonesia, where Australian development assistance is projected to total AUD299 million in 2020–2021, features prominently in DFAT's Health for Development Strategy (2015-2020). The project also supports the achievement of Goal 3 and Goal 16 of the Sustainable Development Goals, which Australia has ratified.	50,396.00	54,294.00	54,377.00	0.00	0.00	159,067.00	INTERNATIONAL PHARMACEUTICAL FEDERATION
LP210100435 Kepert, Prof Cameron J	Advanced Molecular Frameworks for Sodium Battery Electrode Applications This project aims to develop new molecular materials capable of high capacity sodium-ion insertion. Through an innovative interdisciplinary approach that targets the synthesis and detailed characterisation of an extensive family of materials this project expects to generate major advances in the understanding of how the chemical, physical and structural attributes of the materials relate to their electrical charge/discharge behaviours. Significant anticipated outcomes and benefits include the development of new material design approaches that optimise battery electrode performance across a diverse parameter space, and the generation of advanced new materials worthy of commercial development in low-cost, large-scale battery applications. National Interest Test Statement Following major recent scientific and technological advancements the expansion of molecular framework materials into hi-tech industries is underway. Immense opportunities now exist for the development of materials that will underpin these new technologies. Key attributes of these systems are their robust open lattices and incorporation of electrically-active metal ions, features that make them particularly suited for use as battery electrode materials. This Project aims to develop an extensive family of materials with highly promising electrode capabilities, to yield key materials design approaches and discrete materials suited to targeted next-generation battery applications. The development of these materials promises major national economic benefits through local production opportunities. More broadly, the work promises to accelerate the global push towards the adoption of renewable energy cycles. The Project will provide essential training of early career researchers in state-of-the-art science and technology, fostering leadership and promoting a long-term creative research culture in Australia.	185,051.00	197,803.00	214,519.00	0.00	0.00	597,373.00	RUX ENERGY PTY LIMITED

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LP210100437	In-situ biofunctionalisation for additive manufacturing	143,313.00	139,144.00	149,110.00	0.00	0.00	431,567.00	REGENHU LTD
Akhavan, Dr Behnam	<p>Additive manufacturing that incorporates printing of live cells can create hierarchical, multi-component structures that mimic biology. However, an ability to include spatially segregated biological cues is currently lacking. This project will develop plasma pen modules to selectively functionalise surfaces and interfaces, as they are being printed, with robustly immobilised hydrogels and biological signalling molecules to direct cell behaviour. The expected outcome is a green technology enabling the fabrication of structures that replicate the native environments of cells in the body to provide optimal efficacy in drug discovery and regenerative medicine, and significant benefits for the Australian biomedical sector.</p> <p>National Interest Test Statement</p> <p>This project will develop a powerful new enabling technology for wide-spread use in additive biofabrication, a promising field of 3D-printing where living cells, hydrogels, molecules and polymers are combined into a single construct that can replace diseased or injured tissue. The prototype plasma pen device it will design will enable a 3D-biofabrication system to create structures that replicate the native environments of cells in the body. The plasma pen will be capable of producing more effective cell culture platforms for drug discovery, disease modelling and ultimately tissue engineered replacement organs. Developing this new, more sustainable, enabling technology will position Australia at the forefront of a globally significant emerging field and bring substantial commercial and economic benefits across the medical technology and health sectors. Translation of the technology will ultimately lead to significant societal benefits including improved healthcare outcomes through advancing and lowering the cost of personalised medicine.</p>							
	The University of Sydney	857,882.00	904,763.00	931,791.00	280,332.00	0.00	2,974,768.00	
University of Technology Sydney								
LP210100129	Knowledge discovery and recommendation of multimedia data in healthcare	124,528.00	125,557.00	126,685.00	0.00	0.00	376,770.00	INTERACT TECHNOLOGY PTY LTD
Xu, A/Prof Min	<p>The project aims to develop tools to abstract/streamline the ever-growing information-rich multimedia contents into easily discoverable knowledges. Advanced multimedia knowledge graph will be first time developed to accurately exploit hidden knowledge for health industry, and served to generate right information recommendation for healthcare professionals (HCP) at the right time. The proposed technology will improve HCPs' communication, keep them up to date, and enhance their speedy reaction to constantly changing situations/diseases, thus reducing poor patient outcomes and unnecessary hospital costs. It will make significant impact to a range of industries, e.g. healthcare, where personalised professional recommendation is demanded.</p> <p>National Interest Test Statement</p> <p>Knowledge derived from this project will inform the development of the latest healthcare practices and information recommendations at the HCPs, healthcare industry and national levels, thereby contributing to the development of cost-effective treatments and healthcare system efficiency at a large scale. This is an important outcome given that the total spending on health in 2020-21 is estimated to be A\$85.5 billion, and a further growth trend in the future, has a larger influence on Australia's economy than many other financial sectors. For the first time developed in health domain, multimedia knowledge graph will satisfy the needs of cross-modality information extraction and representation in a connected world, and accurately predict dynamic user interests for explainable online recommendation. It will greatly reduce the time and resources spent on searching hot spots and filtering through huge amounts of Internet data. It will also help individuals/organisations or government agencies to promptly identify hot spots and take immediate action to take control of situations and make business decision.</p>							

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LP210100378 Zhu, Dr Xi F	Wideband Silicon-Based Radio-Frequency Front-End Module for 5G New Radio The project aims to advance knowledge in radio-frequency integrated circuit design in low-cost silicon technologies, particularly power amplifiers design with enhanced energy efficiency at output power back-off levels. The intended outcome of this project will be a wideband RF front-end module with beam steering capability that can cover the 24-50 GHz spectrum band. This will ultimately enable the creation of a low-cost and energy-efficient 5G millimetre-wave network that could potentially trigger the development of ultra-reliable low latency communications, which is critical for emerging intelligent transportation systems and will maintain Australia's leadership position in the development of break-through wireless technology.	129,646.00	134,138.00	134,138.00	0.00	0.00	397,922.00	ANDAR TECHNOLOGIES PTY LTD
National Interest Test Statement This project will produce low-cost and energy-efficient integrated circuits that are essential for the next, major evolution of mobile communication systems. The new systems will enable ultra-high-speed mobile wireless networks that can match the performance of optical fibres at a fraction of the cost. This will consequently provide significant economic and social benefits through faster data transmission and enhanced reliability to many end users in both rural and metropolitan areas, e.g. through remote education, eHealth, agriculture, new mobile business opportunities. This project will strongly enhance the ability of Australian technology companies, including the partner organisation, to offer low-cost, high-performance, innovative commercial products to these significant, global markets. By being ahead of growing demand, this will create new Australian jobs and generate new export income. Finally, this industry-relevant research project will provide training opportunities for the next-generation of job-ready researchers and engineers in Australia with advanced circuit design skills for local companies.								
LP210100414 Lu, Prof Jie	Transfer Learning for Genome Analysis and Personalised Recommendation This project aims to improve the accuracy, adaptability, and comprehensiveness of health characteristic predictions and provide personalised recommendations for healthcare service and disease prevention. The deliverables include uncertainty learning and multi-source transfer learning methodologies for predictions based on genome analysis that distils and transfers useful knowledge from multiple sources into an Australian genome analysis model. A federated cross-domain recommender system will be developed to profile individuals and generate personalised recommendations. The outcomes are expected to create a paradigm shift in learning-based prediction and personalised recommendations to support healthcare services in complex environments.	221,058.00	231,768.00	245,956.00	0.00	0.00	698,782.00	23 STRANDS PTY LTD
National Interest Test Statement This project capitalizes on Australia's strengths in science and technology to generate wider economic benefits through improved knowledge translation and commercialisation, and partnerships with industry. It is aligned with the National Science and Research Priority: Health, to have "better models of health care and services that improve outcomes, ..., improved prediction, identification, tracking, prevention and management of emerging local and regional health threats". The project will revolutionise our understanding of the associations between genes and diseases by developing AI empowered techniques and tools for knowledge transfer, predicting correlations and providing evidence-based recommendations, allowing healthcare professionals to build efficient applications that integrate the frontier of genomics into treatment regimens and better models of health care services for disease prevention. A target area of application is chronic diseases which accounts for 36% of the total burden of disease in Australia and 38% of this cost burden is preventable.								
University of Technology Sydney		475,232.00	491,463.00	506,779.00	0.00	0.00	1,473,474.00	
New South Wales		2,779,313.00	2,774,944.00	2,717,961.00	558,332.00	153,000.00	8,983,550.00	

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Northern Territory

Charles Darwin University

LP210100011	Indigenous-led Sea Country Management: Protecting Australia's Marine Estate	135,141.00	216,138.00	181,536.00	0.00	0.00	532,815.00	DHIMURRU ABORIGINAL CORPORATION, BARDI AND JAWI NIIMIDIMAN ABORIGINAL CORPORATION RNTBC, DEPARTMENT OF ENVIRONMENT, PARKS AND WATER SECURITY, ENVIRONMENTAL DEFENDERS OFFICE LTD, MILINGIMBI AND OUTSTATIONS PROGRESS RESOURCES ABORIGINAL CORPORATION, PARKS AUSTRALIA
Christie, Prof Michael	This project aims to understand and support the aspirations and achievements of Sea Country Traditional Owners in leading the management of their marine and coastal estates. The project expects to generate new approaches to marine management based on Indigenous knowledge and governance systems and reconceptualise marine spatial and conservation planning methodologies. Expected outcomes include solutions to problems faced by Indigenous and non-Indigenous marine managers working in remote and cross-cultural spaces and supporting governments to implement effective and equitable legal and policy frameworks. This may provide significant cultural, environmental and economic benefits to Traditional Owners, governments and the Australian community.							

National Interest Test Statement

Globally and nationally marine environments face significant threats. Indigenous Australians maintain strong connections to their marine and coastal Country (Sea County) but compete with many other voices when strategies to protect marine areas are being developed. This project seeks to develop innovative solutions to these problems by drawing on the growing capabilities of Indigenous peoples to lead the collaborative management of their Sea Country. It aims to support Traditional Owners' authority to look after their Sea Country by coordinating marine stakeholders to deliver biocultural conservation outcomes which benefit all marine users. This would improve the efficiency of government environmental spending, the effectiveness of conservation policy, create remote Indigenous employment and support the maintenance and use of Indigenous knowledge. It would deliver on the Australian Governments' Research Priorities (#8 Environmental Change), the Northern Territory Government's Coastal and Marine Management Strategy, and the protected area management plans of government and Indigenous Partner Organisations.

Charles Darwin University	135,141.00	216,138.00	181,536.00	0.00	0.00	532,815.00
Northern Territory	135,141.00	216,138.00	181,536.00	0.00	0.00	532,815.00

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(Columns 1 and 2)	(Column 3)							
Queensland								
Queensland University of Technology								
LP210100098	Constructing a rich curriculum for all: 'Insights into practice'	54,576.00	62,137.00	63,285.00	0.00	0.00	179,998.00	DEPARTMENT OF EDUCATION
Mills, Prof Martin D	<p>Not all students in Australia have access to the same high quality curriculum. The curriculum is often differentiated in ways designed to make outcomes achievable for marginalised young people. While this is often well meant, it has worked against the interests of these young people by denying them from a young age the same levels of access to curriculum options as their peers. This narrows the range of their future opportunities. This project aims to provide the foundations for strategies that can be implemented by teachers, schools and systems to address this problem. This projects works closely with teachers to determine a framework that can encourage pedagogical approaches that make a rich curriculum accessible to all.</p> <p>National Interest Test Statement</p> <p>This research responds to current national educational priorities in the Melbourne Declaration, the Gonski Report and the National Report on Schooling in Australia. The 2008 Melbourne Declaration on Education Goals for Young Australians commits Australian governments to strive for world-class curriculum and assessment, as part of a quality schooling system for all young Australians. However, the 2011 Gonski Report noted that compared to other OECD countries, Australia's academic performance has declined since 2000. Gonski identified a strong link between low levels of achievement and educational disadvantage, particularly for students from low socioeconomic and Indigenous backgrounds. The National Report on Schooling in Australia (2018) noted a retention rate Yrs. 10 to 12 of just 82.8% (Aboriginal and Torres Strait Islander students, 62.6%). The proposed research responds to these national educational challenges by supporting teachers to build capacity to craft pedagogical responses that make rich and meaningful curricula accessible to all students, not just those from privileged backgrounds.</p>							
LP210100217	Industrially Viable Routes for fabrication of Perovskite Solar Cells	111,987.00	121,086.00	125,195.00	0.00	0.00	358,268.00	GREATCELL SOLAR AUSTRALIA PTY LTD
Wang, Prof Hongxia	<p>Photovoltaic technology based on perovskite solar cell (PSC) is predicated to account for USD34.8 billion by 2027 in the global market. The current synthesis protocol using detrimental solvent for perovskite formation and the unsatisfactory stability of perovskite are two key barriers for commercial production of PSC. This project aims to develop new synthesis methods for stable perovskite materials in solar cells by utilizing green solvents that are viable for large scale production. The anticipated outcomes including industrially compatible material synthesis methods for efficient, stable PSC will significantly advance the manufacture capability and competitiveness of the industrial partner in this important area.</p> <p>National Interest Test Statement</p> <p>Development of clean energy technologies that are efficient, cost-effective and reliable is one of the national Science and Technology Priorities. Perovskite solar cells that use organometallic perovskite material as light absorber is an emerging photovoltaics (PV) that have demonstrated the huge potential as a true candidate to produce cost-effective solar electricity in the future if commercialised. This project addresses the key hurdles for industrial production of high quality, stable perovskite materials for applications in solar cells. The main outcomes of a cutting -edge technology enabling industrially fabrication of high quality, stable perovskite materials for high performance solar cells will significantly enhance the Australian industry partner 's manufacture capability and competitiveness in this new PV technology, which has huge market, thus generating economic benefit, sovereign manufacturing capability, and create more job opportunities in Australia. This project aligns with the several of the national Science and Technology Priorities including Advanced Manufacturing and Clean Energy.</p>							

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LP210100240 Haworth, Prof Narelle L	The Safer Scooting Study E-scooters are a new transport option experiencing rapid uptake, but many people are concerned about their safety. This project aims to provide an understanding of how and why people use e-scooters and how rider behaviour and safety outcomes change with experience. The anticipated goal of this project is to harness the potential benefits of e-scooters as an efficient replacement for short car trips and a way of improving access to public transport, while minimising the dangers to riders and pedestrians. This knowledge is expected to inform governments at all levels, industry and riders on how to optimise e-scooter design, use and regulation to contribute to improvements in transport, health and environmental outcomes for all Australians.	117,237.00	102,337.00	79,237.00	0.00	0.00	298,811.00	UNIVERSITY OF TENNESSEE, KNOXVILLE, BIRD RIDES AUSTRALIA PTY LTD
National Interest Test Statement E-scooters are a new urban transport option that promise to replace short car trips, reducing traffic congestion and pollution. Since their introduction to Australia, they have proven popular with riders but many in the community have expressed concern about their safety for riders and pedestrians. This project aims to learn more about the behaviours and attitudes of e-scooter riders and how this changes with experience. It will also examine the types of e-scooter trips that are being made and the extent to which they are replacing car trips, compared to replacing walking and cycling. The knowledge and recommendations from this research will be shared with riders, e-scooter scheme operators and manufacturers, all levels of government and the scientific community to inform policies and practices to maximise their benefits for the community.								
Queensland University of Technology		283,800.00	285,560.00	267,717.00	0.00	0.00	837,077.00	
The University of Queensland								
LP210100043 Edraki, A/Prof Mansour	Gaining insights into mine waste dumps to avoid environmental legacies The project aims to develop new methods for identifying pollution source hotspots and pathways inside mine waste rock dumps. This addresses the national need for effective management of Acid and Metalliferous Drainage (AMD), which is now a critical consideration in the viability of new mines and in confronting pollution legacies of old mines. The research will develop and test innovative methods of geophysical and geochemical analysis and their integration that provide 3-dimensional mapping of key physical and chemical features of the dump. Expected outcomes include greater confidence in the ability of the mining industry to manage its AMD liability.	150,876.00	100,776.00	74,251.00	0.00	0.00	325,903.00	BHP GROUP LIMITED, GAP GEOPHYSICS AUSTRALIA PTY LIMITED
National Interest Test Statement Australia has approximately 350 medium-to-large operating mines, and some 60,000 abandoned mines. Nationally, mine closure costs and potential environmental liability are continually increasing. Managing Acid and Metalliferous Drainage (AMD) from mine waste rock dumps (WRDs) is of greatest concern: closure costs associated with AMD management are expected to exceed \$770 million per year in Australia based on international experience. More efficient, more reliable and more cost-effective AMD management options are therefore of considerable economic benefit to Australia. The project aims to contribute to that goal by providing new methods for identifying and mapping out AMD hotspots. As well as supporting better closure planning, this would support improved public, government and investor confidence in the industry to manage its environmental challenges.								
LP210100059 Kaserzon, Dr Sarit	Reducing glyphosate exposure from high use practices This project aims to investigate methods of reducing occupational exposure to glyphosate, a ubiquitous pollutant of emerging concern. This will be achieved through developing new cost-effective analytical and sampling tools and refining methods for integrating human exposure (biomonitoring) data with surveillance data on the pathways of glyphosate exposure from high use. The project will generate new targeted knowledge on (sub) population-specific chemical exposures in Australia, and globally. Such data are critical to inform public health and chemical regulation policy, and provide clear guidance aimed at reducing exposures, to assess the effectiveness of existing regulations, and provide a framework for implementing surveys in the future.	50,000.00	78,000.00	74,000.00	0.00	0.00	202,000.00	MASSEY UNIVERSITY, NZ, QUEENSLAND HEALTH, DEPARTMENT OF TRANSPORT AND MAIN ROADS, 3M AUSTRALIA PTY LTD

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	National Interest Test Statement							
	This project is expected to deliver critical information on the pathways and risk of human occupational exposure to glyphosate in Australia that is task specific and introduces a targeted approach to human exposure studies. This new knowledge is vital to our Partner Organisations and fundamental to inform chemical use advice and regulation and public health policy, thus ensuring potential adverse health effects associated with glyphosate can be effectively managed. Ultimately, this will better inform decision-makers to implement public health policies and chemical regulation strategies to minimise risk and exposure to humans and the environment. The benefits to the Australian community from the project cover health and social benefits associated with understanding and reducing factors that affect chemical use and exposure, and providing tools for assessing intervention and risk reduction strategies applicable to a wide range of high use chemicals and in occupational as well as household settings.							
LP210100096	Australian human rights complaints: Litigation, mediation or conciliation	53,525.00	106,071.00	66,987.00	0.00	0.00	226,583.00	AUSTRALIAN HUMAN RIGHTS COMMISSION, VICTORIAN EQUAL OPPORTUNITY AND HUMAN RIGHTS COMMISSION, QUEENSLAND HUMAN RIGHTS COMMISSION, ACT HUMAN RIGHTS COMMISSION, CAXTON LEGAL CENTRE INC, CANBERRA COMMUNITY LAW LTD
Walsh, Prof Tamara	This project will assess the effectiveness of the mechanisms used to resolve human rights complaints in Australia – conciliation, mediation and litigation. It will be the first project to evaluate the effectiveness of these mechanisms in a human rights context. Working with industry partners from the legal sector and four human rights commissions, this project will generate new knowledge on human rights complaints and on the views of key stakeholders about the effectiveness of the mechanisms used to resolve human rights complaints. This new information will inform legal and policy reform throughout Australia. The expected outcomes include developing a robust evidence-based model for human rights dispute resolution in the Australian context.							
	National Interest Test Statement							
	In the COVID-19 era, governments must impose limitations on individual rights. This has led to increased complaints and litigation, which is costly for the legal system, government and human rights commissions. This project will study human rights complaints and the efficacy of current methods of dispute resolution. It will develop a best practice model for human rights dispute resolution in Australia which aims to: reduce the number of human rights cases brought before the courts; reduce the time it takes to resolve a human rights complaint; and strike an appropriate balance between individual rights, and governmental and community interests. The economic and social benefits for Australia include: reducing the costs of resolving humans rights complaints; the successful resolution of complaints from the perspective of both complainants and respondents so that human rights are protected but also reasonably limited when necessary; respecting the separation of powers; and ensuring that vulnerable groups, including First Nations peoples, have access to appropriate complaint resolution mechanisms.							
LP210100101	Gut Absorption of Constrained Peptides for Local and Systemic Targeting	229,815.00	235,120.00	246,600.00	0.00	0.00	711,535.00	PROTAGONIST THERAPEUTICS INC.
Stow, Prof Jennifer L	Aims: This project aims to investigate how peptides are absorbed across the intestinal wall and distributed to organs and fluids in a rodent model by combining bio-analysis and pharmacokinetics with high-resolution microscopy and imaging. Significance: This project expects to generate the most comprehensive survey to date of the pathways and mechanisms of peptide absorption, biodistribution and immune cell targeting, by implementing innovative approaches. Expected Outcomes: Expected outcomes include significant new knowledge and a new multi-disciplinary platform for measuring peptide absorption. Benefits: This should provide significant benefits by informing the future design of peptides for supplements, therapeutics and carriers.							
	National Interest Test Statement							
	This research will combine multiple approaches and state-of-the-art facilities to provide the most detailed analysis to date showing how peptides are absorbed across the intestinal wall. The fate of absorbed peptides will be measured, including the efficiency of their distribution to other organs and fluids and their ability to reach specific target cells and molecules. As small, constrained proteins, peptides can be engineered for use as carriers for different probes, nanoparticles, bioactive molecules and as therapeutics or dietary supplements for animals, agriculture and humans. Oral delivery is the most accessible, economic and beneficial route for administering peptides, however intestinal absorption of peptides is still a poorly understood process. This project will offer a new level of fundamental knowledge, innovations and measurements of peptide absorption to inform research, industry and the public. The outcomes will benefit multiple national industries and end-users, by improving the design, modifications, dosing and administration of peptides used in animals, agriculture and humans.							

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LP210100170 Vetter, Prof Irina	A humanised sensory neuron high-throughput screening platform Sensory neurons are responsible for converting external stimuli such as touch or temperature into graded electrical signals that allow us to interact with the world around us. However, unlike other cell types, sensory neurons cannot proliferate and thus must be removed from human cadavers, or animals, in order to study their pharmacology and function. This limits our ability to understand neuronal signalling pathways. This project aims to use sensory neurons derived from human stem cells to develop and optimise assays that can be used to study the pharmacology and function of human sensory neurons in vitro. This enhances access to critical model systems and technology platforms and removes the need for isolation of cells from cadavers.	82,371.00	87,145.00	0.00	0.00	0.00	169,516.00	ANATOMIC INCORPORATED
National Interest Test Statement This project seeks to develop novel cellular systems that permit interrogation of the function and pharmacology of human sensory neurons derived from renewable stem cell resources. Such cellular systems will be of interest to researchers studying sensory neuron function, and thus contribute to new knowledge about this unique cell type. In addition, the findings of this project will accelerate pharmacological studies and will provide information vital for the Australian Pharmaceutical industry. The project will train the next generation of researchers and will contribute to a sustainable biotechnology sector in Australia. Thus, the project contributes to Australia's national interest through its potential economic benefits resulting from translating this research to commercial outcomes.								
The University of Queensland		566,587.00	607,112.00	461,838.00	0.00	0.00	1,635,537.00	
University of Southern Queensland								
LP210100020 Chen, Prof Dr Zhi-Gang	Wearable thermoelectric textiles for portable microelectronics Wearable thermoelectrics enable the power generation from the temperature difference between human body and ambient temperature by using thermoelectric effect. This project aims to design eco-friendly wearable thermoelectric textiles to realize high-efficiency solid-state power generation and meet individual needs with human comfort and health. The target is to achieve a power density in the as-designed thermoelectric textiles by the optimization of materials and device design. The outcome will open up a new platform for the green and sustainable charge for portable microelectronics, which will lead to an innovative technology for energy management, which will place Australia at the forefront of wearable electronics and textile industry.	225,247.00	225,247.00	247,947.00	0.00	0.00	698,441.00	MERINO & CO. PTY LTD
National Interest Test Statement Wearable thermoelectric devices can harvest electricity from body heat to charge wearable devices, which will open an avenue in the electronic industry. Cost-effective, eco-friendly, and wearable thermoelectrics will be integrated with wool or fabrics to form smart textiles for thermal regulations and power generations, which will bring tremendous economic and environmental benefits to our society. The success of this project will provide brand-new technology and scientific fundamental outputs in the field of thermoelectrics and wool industry, which will significantly enhance the international visibility and impact of Australia in the area of development of smart textiles. The developed technology will be utilised in the wool and electronics industry for wearable microelectronics. In this case, the consequence of this project will help to create new employment opportunities in the fields of electronics and wool industry, and will provide wealth generation for Australia.								
University of Southern Queensland		225,247.00	225,247.00	247,947.00	0.00	0.00	698,441.00	
Queensland		1,075,634.00	1,117,919.00	977,502.00	0.00	0.00	3,171,055.00	

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(Columns 1 and 2)	(Column 3)							(Column 10)
South Australia								
Flinders University								
LP210100430	Sustaining intensive agriculture through droughts and floods	297,839.00	299,819.00	299,679.00	0.00	0.00	897,337.00	LOWER BURDEKIN WATER
Werner, Prof Adrian D	<p>This project aims to develop state-of-the-art conceptual and numerical models of river-soil-groundwater interactions to address complex and persistent questions on water sustainability in the Lower Burdekin Delta, Queensland, where groundwater pumping to irrigate sugarcane has been supplemented by artificial recharge for over 50 years. This project expects to deliver new knowledge of critical aquifer processes to inform the scheme operation, the largest in the country. Expected outcomes include ground-breaking management plans for the aquifer-replenishment scheme. Anticipated benefits involve balancing the needs of agriculture and the protection of pristine environments, including groundwater discharge to the Great Barrier Reef.</p> <p>National Interest Test Statement</p> <p>This project is expected to develop new investigative techniques and enhanced knowledge of coastal aquifer processes and water and nutrient cycling associated with an intensive agricultural area of the Queensland dry tropics, the Lower Burdekin Delta. The project will inform artificial-recharge operations, the largest scheme of its type in Australia, through the creation of ground-breaking adaptive management strategies to protect freshwater resources, environmental assets (including nationally important ecosystems) and economic activities of the region. The world-class research team and highly motivated partner organisation propose innovative hydrological modelling and novel field measurements to address persistent knowledge gaps that will underpin the development of exemplar management plans, meeting global standards for adaptive management, including under future climate conditions. These are expected to guide sustainable practices in water and land management to achieve economic, environmental and social outcomes for the study area.</p>							
LP210100450	Designing successful genetic-rescue approaches for threatened species	154,685.00	233,137.00	143,316.00	239,484.00	0.00	770,622.00	DEPARTMENT FOR ENVIRONMENT AND WATER, KANGAROO ISLAND WILDLIFE PARK, KOALA LIFE, WORLD WIDE FUND FOR NATURE AUSTRALIA
Bradshaw, Prof Corey J	<p>This project aims to determine how threatened populations of inbred native species can be 'genetically rescued' by introducing genetically healthy individuals. This is significant because Australia is a global hotspot of extinctions and threatened species, so tools that can be used to offset extinction risk will benefit entire ecosystems at risk. We will focus on two inbred populations of koalas in South Australia to (1) measure and map patterns of genetic diversity, (2) map densities and track individuals to measure demography, (3) develop advanced spatial models that combine population demography and genetic processes to predict the effectiveness of genetic rescue, and (4) source and rear healthy individuals to test our predictions.</p> <p>National Interest Test Statement</p> <p>Australia is a global hotspot of extinctions, leading the world's nations in mammal extinctions in particular. Invasive predators, deforestation and forest fragmentation, and general human encroachment have caused many populations of remaining native species to dwindle. This results in the genetic erosion of the remaining, fragmented populations, and eventually leads to inbreeding depression that further reduces a population's resilience to threats like climate change and other human-caused environmental degradation. This project aims to test how one type of intervention called 'genetic rescue' can be used efficiently to increase the genetic diversity in populations of threatened species. We will test the degree of inbreeding in two introduced populations of koalas in South Australia (and ideal test species), and combine this information with advanced computer models to predict how the introduction of healthy koalas can 'genetically rescue' inbred populations. The information derived can then be applied to threatened populations of koalas and potentially other species in other parts of Australia.</p>							
Flinders University		452,524.00	532,956.00	442,995.00	239,484.00	0.00	1,667,959.00	

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The University of Adelaide								
LP210100155	GM Holden and the Mobilisation of Private Industry during World War II	129,200.00	127,229.00	146,807.00	0.00	0.00	403,236.00	STATE LIBRARY OF SOUTH AUSTRALIA, NATIONAL ARCHIVES OF AUSTRALIA
Sendziuk, A/Prof Paul J	Through a focus on General Motors Holden (GMH), this project aims to explain how Australian industry adapted, diversified, and developed new workforce skills during World War II. Its significance lies in expanding knowledge of GMH's under-recognised role and impact on Australia's industrial economy during a pivotal moment in the nation's history. In doing so, it will contribute to broader current discussions about the importance of maintaining Australian manufacturing industries and their capacity to adapt rapidly in times of crisis to meet national needs. The expected outcomes and benefits include the generation of new interpretive texts and exhibitions for libraries and museums, and building research capacity in early career researchers.							
	National Interest Test Statement							
	This project will explain how Australian industry adapted, diversified its production and developed new workforce skills during World War II, and, in doing so, it will contribute to broader contemporary discussions about the importance of maintaining Australian manufacturing industries and their capacity to adapt rapidly in times of crisis to meet national needs. It will advance knowledge about General Motors Holden's lesser known contribution to Australia's industrial economy and society during WWII. It will also advance our knowledge of the way Australian workers banded together under difficult conditions to develop innovative solutions to complex manufacturing problems, while carving new spaces for themselves in the workplace. The researchers' partnerships with the State Library of SA (Adelaide), the National Archives of Australia (Canberra), and the Shrine of Remembrance (Melbourne) provide cost-effective outlets for the communication of the project's findings to the general public via exhibitions and the production of interpretive materials.							
LP210100360	A Novel Inline High-Efficiency Motor/Pump System	50,092.00	50,656.00	50,656.00	0.00	0.00	151,404.00	INTELLIGENT ELECTRIC MOTOR SOLUTIONS PTY LTD
Ertugrul, A/Prof Nesimi	Around 19% of the world's and 30% of the Australia's electric energy is consumed by pump technologies. Significant energy savings are possible if the major components of pump systems, including inverter, motor and pump, operate at their maximum possible efficiency under varying loads. A novel pump design in this project accommodates integrated electronics in a submersible housing. A seal-less design helps mitigate several aspects of pump failure and its in-line structure reduces assembly cost. Accurately measured efficiency maps will be utilised to demonstrate the non-linear relationship between motor and pump quantities as well as developing models for indirectly estimating feedback quantities and achieving the highest system efficiency.							
	National Interest Test Statement							
	Throughout Australia, water pumps are used in air conditioners, irrigation systems, swimming pools and many other industry applications which account for about one third of our electricity usage. Technological limitations, such as poor pump and electric motor matching, inefficient operation and mechanical seal breakdowns, result in the use of excessive electricity. This research addresses these limitations by demonstrating efficiency improvements and durability using a novel in-line and seal-less pump design with a submersible variable speed motor technology. Challenging the majority of current pumping systems, this integrated motor-pump system will demonstrate significant efficiency improvements, ease of assembly, reduced maintenance costs and sensor elimination techniques. This technology will be well-suited for local development and manufacturing thus promoting Australian industry. Furthermore, it has the potential to replace many traditional pumping applications and directly utilise renewable energy for regional and remote applications, addressing challenges for clean energy production and electricity consumption.							

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(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	(Column 9)	(Column 10)
LP210100415	Beyond the limits of corrosion detection in inaccessible areas	156,768.00	165,193.00	50,593.00	0.00	0.00	372,554.00	NDE SOLUTIONS PTY LTD
Ng, A/Prof Ching Tai	<p>The project will develop a new technology for medium-range corrosion mapping in inaccessible areas of infrastructure. This will overcome the limitations of existing corrosion inspection techniques for corrosion inspection at inaccessible areas. The project will create a new concept and generate new knowledge on accurate corrosion mapping in inaccessible areas. The expected outcomes are significant improvements in the capability and practicability over existing corrosion inspection technologies adopted by industry for a wide range of infrastructure, in particular the Oil and Gas, Mining, Energy and Water infrastructure, as well as improving the reliability and cost-efficiency of the corrosion inspection.</p> <p>National Interest Test Statement</p> <p>The project will advance the scientific and technological basis for corrosion inspection at inaccessible area for high-value asset infrastructure for Oil and Gas, Mining, Energy and Water infrastructure, and infrastructure for Future Fuel, Hydrogen. By exploring the physical natures of guided waves in metallic structures of these industry sectors, a much more advance and practical corrosion mapping technology will be developed. It will enable engineers and asset owners to achieve a more cost-effective and reliable corrosion inspection at inaccessible area, as well as increase reliability, sustainability and operational safety. It will result in cost savings for Australian operators of high-value assets, as well as increased competitiveness of Australian industry sectors. The outcomes will contribute directly to the Science and Research Priorities of Energy through “new clean energy sources and storage technologies that are efficient, cost-effective and reliable” and Resources, through “technologies to optimise yield through effective and efficient resource extraction, processing and waste management”.</p>							
	The University of Adelaide	336,060.00	343,078.00	248,056.00	0.00	0.00	927,194.00	
University of South Australia								
LP210100290	Real-time scheduling of trains to control peak electricity demand	93,746.00	93,746.00	98,146.00	0.00	0.00	285,638.00	TTG TRANSPORTATION TECHNOLOGY PTY LIMITED
Pudney, A/Prof Peter J	<p>This project aims to develop new scheduling and control methods that will enable railways to reduce their demand for electricity during peak demand periods, without undue disruption to the timetable. These new methods and systems will integrate with—and expand the capabilities of—an Australian train control system that is used by railways around the world. This will enable better management of electricity within a region and better use of renewable energy sources, with significant cost savings for railways and the wider community.</p> <p>National Interest Test Statement</p> <p>Electric trains are an efficient means of transport, but are significant users of electricity. During periods of peak demand in the wider community, the availability of electricity is limited and the cost becomes high. The aim of this project is to enable railways to respond to electricity constraints and high electricity prices by making small adjustments to train schedules that preserve key arrival times but result in significant overall reductions in peak power demand. TTG is a key supplier of energy-saving driving advice systems to the global market. One of their customers, SNCF in France, has estimated that it can save 1.5 million euros each year by reducing the energy consumption of its trains during peak demand periods, and defer the need to build new power stations. Similar opportunities are available in Australia. The research will extend the scope of TTG's products to give railways new ways to reduce costs, and at the same time contribute to the flexibility and reliability of electricity supply systems, enabling greater use of renewable energy.</p>							
	University of South Australia	93,746.00	93,746.00	98,146.00	0.00	0.00	285,638.00	
	South Australia	882,330.00	969,780.00	789,197.00	239,484.00	0.00	2,880,791.00	

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(Columns 1 and 2)	(Column 3)							
Tasmania								
University of Tasmania								
LP210100343	Automated Sensors for a ‘wetland in a box’	163,431.00	128,431.00	132,971.00	53,756.00	0.00	478,589.00	SYRINX ENVIRONMENTAL PTY LTD, SOUTHERN WASTE SOLUTIONS
Breadmore, Prof Michael	Globally, and particularly in Australia, water supply and water pollution is one of the most critical constraints to our health and growth. This project seeks to validate a new portable remediation system suitable for deployment at regional locations through the integration and development of advanced sensors. We aim to develop the world's first completely integrated platform for monitoring both water chemistry and microbiology to provide near-real-time information regarding the quality of the remediated water. We expect this to improve the availability of regional water resources by providing a low-cost remediation solution with integrated monitoring to provide assurances of meeting the Australian Guidelines for Water Recycling (2006).							
	National Interest Test Statement							
	Polluted water associated with landfills, mines and urbanisation is a major global environmental and economic burden, yet these water resources (>100 GL/yr in Aus alone) if treated are an untapped opportunity for Australia given we are the driest inhabited continent on earth. This project will test and develop on-line water quality sensors for microbial and chemical pollutants integrated into a mobile water remediation system. It will guarantee high quality water validated in real time for fit-for-purpose reuse in both rural and urban regions. The combined technology and sensors is of significant benefit to Australia since it will reduce the public and environmental health risks associated with unvalidated water quality in regional and remote Australia, and enable early detection of disease outbreaks, and ‘new’ supplies to support irrigation, stock water, environmental flows and potentially drinking water. This technology has wide reach across multiple sectors and can substantially contribute to reducing the multi-billion dollar water remediation liability and public health burden.							
	University of Tasmania	163,431.00	128,431.00	132,971.00	53,756.00	0.00	478,589.00	
	Tasmania	163,431.00	128,431.00	132,971.00	53,756.00	0.00	478,589.00	

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Victoria								
La Trobe University								
LP210100122	Alcohol and tobacco use among lesbian, bisexual and queer identifying women	91,377.00	100,994.00	99,146.00	0.00	0.00	291,517.00	DEPARTMENT OF HEALTH, QUIT VICTORIA, ACON HEALTH LIMITED, THORNE HARBOUR HEALTH, VICTORIAN ALCOHOL & DRUG ASSN INC, LGBTIQPLUS HEALTH AUSTRALIA
Bourne, A/Prof Adam H	This project aims to examine practices of alcohol and tobacco use among lesbian, bisexual and queer-identifying (LBQ) women, which are considerably higher compared to heterosexual women. By using an innovative, longitudinal qualitative approach, this project expects to generate new knowledge regarding the cultural and social forces that shape higher rates of alcohol and tobacco use among LBQ women, and to better understand their impacts. It is anticipated that the project will enhance the capacity of health promotion and policy organisations to meet the alcohol management and smoking cessation needs of this population. Findings from this project should help to alleviate health and social inequalities experienced by LBQ women.							
National Interest Test Statement								
Numerous national and international studies have documented poorer social and health outcomes among lesbian, gay, bisexual, transgender, intersex or queer (LGBTIQ) populations. The reasons for this are diverse and may connect with both social stigmas directed towards sexual and gender minorities as well as differing cultures that shape health-related behaviour. The health of gay and bisexual men has long been the focus of study given their disproportionate experience of HIV. LBQ women, by contrast, have been relatively overlooked, despite widely documented inequalities relating to mental health, alcohol and other drug use. The proposed study will bring social benefits to the Australian community by exploring the ways in which LBQ women use alcohol and tobacco and to better understand the social and cultural forces that facilitate higher rates of use. By working in partnership with leading organisations across the alcohol, tobacco control and LGBTIQ sectors, we anticipate new insight that can transform the design and delivery of health interventions for this group, in turn addressing inequality in Australia.								
LP210100181	Family Violence Triage in Family Courts: Safety, Efficacy and Benefit	216,939.00	230,985.00	230,985.00	113,763.00	0.00	792,672.00	FEDERAL CIRCUIT AND FAMILY COURT OF AUSTRALIA, RELATIONSHIPS AUSTRALIA SOUTH AUSTRALIA LIMITED
McIntosh, Prof Jennifer E	Domestic and family violence (DFV) risks are highest during relationship separation, elevated further for parents and children involved in Family Court disputes. Utilising the federal Family Courts’ Triage pilot program, this partnership project aims to examine risk pathways, burdens and costs of post-separation DFV, and the efficacy and cost-benefits of early DFV triage. The project intends to produce new knowledge about family and systemic drivers of safety, to advance evidence on the efficacy of DFV triage and to translate findings into new resources for preventing DFV harms. This world-first study aims to inform global family law policy and practice, with inter-generational benefit for vulnerable Australian families and for society.							
National Interest Test Statement								
Without well targeted intervention strategies, the social cost of domestic and family violence (DFV) to Australian society is estimated to accumulate to \$323.4 billion over a thirty-year period. The most serious burdens of DFV occur for women and children during the process of family separation. This project would contribute to Australia’s national interest through comprehensive new knowledge about the modifiable individual and service factors that enhance safety for this vulnerable population. This project will answer long-standing and persistent calls to fill data gaps on the pathways of post-separation DFV victimisation and perpetration and their costs, and will provide new knowledge about the effects and cost-benefits of early Triage processes. Findings translated into new education resources will support effective partnership between services and parents. The project aims to contribute to the capacity of policy makers, family court and allied relationship services to enhance safety, lift the personal, economic and social burdens of DFV in Australia, and to lead globally on prevention innovation.								
La Trobe University		308,316.00	331,979.00	330,131.00	113,763.00	0.00	1,084,189.00	

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(Columns 1 and 2)	(Column 3)							
Monash University								
LP210100175	Grown not extracted: high performance plant-based polymer packaging	196,192.00	197,904.00	223,894.00	0.00	0.00	617,990.00	VARDEN PROCESS PTY LTD
Batchelor, A/Prof Warren J	<p>This project aims to develop high performance, thermoformed paper-like materials to replace petroleum-derived plastic packaging. The materials are made using mechanically broken down waste cellulose fibres, which are then formed into shapes with added barrier layers. The grant aims to control the mechanical treatment for optimum performance, engineer the shape forming process and design laminate structures to produce packaging materials, which have all the advantages of plastic packaging with none of the environmental drawbacks. The grant also aims to develop new methods to characterise these composites. The intended outcome is a new industry manufacturing renewable, biodegradable packaging in Australia.</p> <p>National Interest Test Statement</p> <p>This project focuses on the problem of formed plastic and aluminium shapes used in food packaging, which are a major pollutant:- 50 million plastic and aluminium coffee pods are discarded every day. The fibre- based packaging that will be developed here is like paper, totally breaking down in the natural environment, but engineered to perform like plastic. There will also be significant commercial and environmental benefits in succeeding. The area of sustainable packaging is extremely dynamic, with new mandates phasing out plastic packaging in Europe. Australia has a wealth of natural resources suitable to this area (Sugar Cane bagasse, timber) and the outcomes of this research will build a “smart hub” of sustainable packaging expertise in Australia as the base for a new manufacturing industry and providing a further competitive advantage for Australian food manufacturing.</p>							
	Monash University	196,192.00	197,904.00	223,894.00	0.00	0.00	617,990.00	
Swinburne University of Technology								
LP210100467	High yield adaptive laser nanomanufacturing system for photonic devices	160,000.00	153,000.00	157,000.00	0.00	0.00	470,000.00	INNOFOCUS PHOTONICS TECHNOLOGY PTY LTD
Jia, Prof Baohua	<p>This project aims at developing an entirely new nanofabrication platform combining adaptive beamshaping with highly accurate large area nanopositioner to simultaneously address the throughput and accuracy challenges in nanomanufacturing. The proposed prototype system and fabricated photonic chips have performance far surpassing the state-of-the-art. Through trial in the industrial best laser nanofabrication system, commercial benefits can be fast tracked for Australian industry in the rapidly expanding nanomanufacturing field. The outcomes lead to a platform technology enabling broad impact and benefits to other high-tech applications requiring high precision and throughput, enhancing Australia's leading position in advanced manufacturing.</p> <p>National Interest Test Statement</p> <p>Direct economic and social benefits of the project will be achieved through lifting the productivity and economic growth of Australian industry in high value adding nanomanufacturing. Existing nanofabrication tools are too expensive for small- and medium-sized enterprises (SMEs) to invest in. With the great cost-effective capability provided by this project, manufacturers are able to set up production line to large scale manufacture high precision devices and novel materials, such as all-optical communication chips, energy harvesting devices, lab on a chip devices and photonics devices, with significantly reduced start-up and running costs. New business opportunities will be enabled in high-tech consumer products leading to more jobs. Therefore, this project firmly fits into the Strategic Research Priorities of Lifting the Productivity and Economic Growth and meet the objective to promote national and international research partnerships between researchers and business, industry, community organisations and other publicly funded research agencies.</p>							
	Swinburne University of Technology	160,000.00	153,000.00	157,000.00	0.00	0.00	470,000.00	

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The University of Melbourne								
LP210100204	Cancer culture: understanding anti-cancer campaigns in Australia	202,000.00	191,400.00	173,000.00	0.00	0.00	566,400.00	CANCER COUNCIL VICTORIA
May, Prof Andrew J	How do we change culture to improve public health? This project investigates the history of Australian anti-cancer campaigns to understand the nexus between science, advocacy, policy and behavioural change. The campaigns of Cancer Council Victoria modified government policy, pushed Australia into international prominence in public health research and translation, and influenced behaviour. The project seeks to analyse the deployment of such campaigns, the socio-cultural and political context that allowed them to leverage policy change, and their connection to life-saving behaviours. Distilling elements of success and failure will better inform advocates and governments in preventing cancer and other diseases through future health promotion.							
National Interest Test Statement								
Australia is an international leader in adopting policies to prevent cancer, most recently leading the world on early detection of cancers, skin cancer prevention, and tobacco control. Since the 1930s, cancer control has been a critical part of Australia's disease control strategy and has spanned the search for prevention, early intervention and cure. By conservative estimates, campaigns to prevent cancer or detect it early have contributed to hundreds of thousands of lives saved in Australia alone, particularly from preventing skin cancer and tobacco-related disease. Understanding the history of these campaigns from their conception to deployment therefore has clear benefits to the national interest by illuminating how scientific advances translate into successful advocacy of State and Federal governments to adopt life-saving policy measures and ultimately change individual behaviours. Revealing how significant changes in policies were achieved and leveraged into material shifts in Australian culture will consequently provide valuable information for the development of future campaigns for healthier living.								
LP210100244	Rare Earth Metal Separation by Polymer Inclusion Membranes	96,413.00	102,113.00	119,779.00	0.00	0.00	318,305.00	NORTHERN MINERALS LIMITED
Kolev, Prof Spas D	The project aims to develop a novel hydrometallurgical method for the separation of the rare earth metals dysprosium and terbium from mixed rare earth metal solutions using polymer inclusion membranes with a crosslinked or non-crosslinked polymer backbone. These metals are crucial for the manufacturing of advanced technology products. The membrane-based method is expected to offer significant advantages over the currently used solvent extraction methods by eliminating the use of solvents and conducting the separation as a continuous process where the extraction and back-extraction steps take place simultaneously. These advantages are expected to make the separation process more cost-effective and drastically reduce its environmental impact.							
National Interest Test Statement								
The proposed research will lead to the development of a new hydrometallurgical method for the separation of selected rare earth metals from mixtures of rare earth metal carbonates using novel and advanced polymeric materials called polymer inclusion membranes. Rare earth metals are critical components of rechargeable batteries, the strongest permanent magnets, electric motors, wind turbines, plasma and light emitting diode screens, computer hard discs, catalytic converters, and fighter jets. The proposed method will provide considerable benefits to the Australian rare earth mining industry by minimising energy consumption and the production of hazardous waste and therefore will be an outstanding example of the application of “Green Chemistry” to large scale industrial separation of strategic mineral resources. This research addresses multiple aspects of the ‘Resources’ national science and research priority with expected flow-on effects to the ‘Advanced Manufacturing’ and ‘Environmental Change’ priorities. The proposed research will also foster international collaboration and research training.								
The University of Melbourne		298,413.00	293,513.00	292,779.00	0.00	0.00	884,705.00	
Victoria		962,921.00	976,396.00	1,003,804.00	113,763.00	0.00	3,056,884.00	

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(Columns 1 and 2)	(Column 3)							(Column 10)
Western Australia								
Curtin University								
LP210100271	Damage Detection and Quantification using Infrastructure Digital Twins	62,794.00	62,794.00	165,243.00	0.00	0.00	290,831.00	PRECISE AI PTY LTD, SENSOREM PTY LTD, CBH GROUP
Hao, Prof Hong	Structural health monitoring is vital for infrastructure assets management as early detection of structural conditions is key to both safety and ongoing maintenance. This project combines computer vision, vibration tests, finite element modelling and deep learning technologies to develop an efficient structural health monitoring system. Digital twins created from images taken by cameras or UAVs will be correlated through deep learning with structural conditions and load-carrying capacities obtained from vibration tests and finite element model analysis for efficient structural damage detection and quantification. The project will lead to effective structural health monitoring and enhance structural safety and reduce maintenance costs.							
	National Interest Test Statement							
	Structural condition inevitably deteriorates with time. Early detection of structural conditions is key to prevent catastrophic collapse and reduce maintenance costs. Current practice in structural condition monitoring is based mainly on visual inspections by assessors, which is time consuming and the assessment is subjective and only qualitative. This project will develop an effective and objective method to create digital twins for structural damage detection from camera images. The digital twins will be correlated with the structural damage level, load-carrying capacity and damage propagation prediction. The outcome of the project allows structural conditions to be detected and quantified efficiently from camera images. It will greatly impact the current practice and reduce the cost of industry partners on structural condition monitoring and maintenance. E.g., CBH typically spends over \$110M/year on maintaining its grain silos. The developed approaches may also find applications in other sectors, e.g., the maintenance cost of LNG trains is about \$9B/year and 60% of their maintenance work is unplanned.							
	Curtin University	62,794.00	62,794.00	165,243.00	0.00	0.00	290,831.00	
Edith Cowan University								
LP210100118	Unlocking the genetic and biochemical potential of kangaroo paws	172,089.00	168,459.00	159,106.00	0.00	0.00	499,654.00	BOTANIC GARDENS & PARKS AUTHORITY, DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS, AUSTRALIAN GENOME RESEARCH FACILITY LIMITED
Field, Dr David L	Using cutting-edge gene technology and an interdisciplinary approach, this project aims to uncover the genes responsible for flower colour in the iconic kangaroo paws of Western Australia, and identify the compounds that produce the colours. The project expects to produce the first entire kangaroo paw genome and identify unique genetic variants and biochemicals underlying colour differences. This new knowledge should help horticultural programs to more easily breed varieties with desirable and highly marketable new colours, and could assist in conserving these amazing Australian plants.							
	National Interest Test Statement							
	Kangaroo paws (Anigozanthos) are an iconic group of plants of great cultural and economic importance to Australia. They generate about A\$50 million annually for the horticulture industry, and are increasingly important in global markets as ornamental pot plants and cut flowers. This project aims to assemble the first Anigozanthos genome and use this resource to uncover the genetic and biochemical basis of their flower colour. The critical information obtained could help horticulturalists to efficiently breed new cultivars with desirable colours, drought tolerance and disease resistance, thus preserving Australia's lead role in developing high-value cultivars for national and global markets. The new knowledge could also help to develop better targeted conservation programs for wild kangaroo paws. In addition, because plant colour pigments have anti-microbial, anti-oxidant, anti-inflammatory and anti-carcinogenic properties, this research could discover unique compounds for further investigation for potential medicinal value.							
	Edith Cowan University	172,089.00	168,459.00	159,106.00	0.00	0.00	499,654.00	

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Murdoch University

LP210100149	Life After Digitisation: Future-Proofing WA's Vulnerable Cultural Heritage	293,100.00	258,637.00	279,730.00	237,599.00	0.00	1,069,066.00	WESTERN AUSTRALIAN MUSEUM, THE TRUSTEE FOR PERTH THEATRE, KIMBERLEY LANGUAGE RESOURCE CENTRE (ABORIGINAL CORPORATION), WANGKA MAYA PILBARA ABORIGINAL LANGUAGE CENTRE (ABORIGINAL CORPORATION), MIRIMA DAWANG WOORLAB-GERRING LANGUAGE AND CULTURE CENTRE, BUNDIYARRA ABORIGINAL COMMUNITY ABORIGINAL CORPORATION, GOLDFIELDS ABORIGINAL LANGUAGE CENTRE
Grehan, Prof Helena M	This project aims to do the following: 1. digitise significant cultural collections held across Western Australia, including Aboriginal languages, the WA performing arts collection, and selected objects of significance from across the State. 2. develop world-leading post-digitisation socialisation processes for the storage, management and dissemination of these collections. The project's significance lies in the preservation of the collections and the development of sustainable access protocols for the collection owners. Expected outcomes include digital preservation of the collections, plus new protocols and procedures for their digitisation and dissemination. Benefits include preservation of, and systems for access to, these collections.							

National Interest Test Statement

The participating WA Universities, the Western Australian Museum, the Perth Theatre Trust and the 5 WA Aboriginal Language Centres involved in this project are each committed to the preservation, in digital format, of key cultural objects from across Western Australia. These include photographs, language recordings, costumes and objects with special historical or cultural meaning for communities. Many of the items are in a fragile state (due to age, climate conditions and storage in outdated formats, for example reel to reel film) and need preservation for future generations. This project will carry out archival standard digitisation and will then work with the partner organisations to develop best practice policies for the storage and dissemination of these digital materials. This will ensure these valuable collections are not only preserved but remain a resource for future generations. A resource that will become, for the first time, accessible to people across Australia and beyond.

Murdoch University	293,100.00	258,637.00	279,730.00	237,599.00	0.00	1,069,066.00
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The University of Western Australia

LP210100166	Reducing self-harm and suicidal behaviours in young people in WA	115,000.00	180,000.00	100,000.00	0.00	0.00	395,000.00	THE STAN PERRON CHARITABLE FOUNDATION LIMITED, GOVERNMENT OF WESTERN AUSTRALIA DEPARTMENT OF EDUCATION, YOUTH FOCUS INC
Lawrence, A/Prof David M	Aims: reduce self-harm and suicidal behaviours in young people by upskilling teachers and providing resources to respond rapidly to students at risk via an innovative intervention with near real-time measures of changes in vulnerability. Significance: self-harm and suicidal behaviours are increasing at alarming rates in young people. Schools are ideally placed to respond but many struggle to do so. New regular measures and advanced machine learning algorithms measuring change in risk in real time will enable schools to respond in a timely and effective manner and save lives. Expected outcomes: a new intervention to reduce self-harm and suicidal behaviours in young people that measures fluctuations in risk via a Temporal Vulnerability Index.							

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(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	(Column 9)	(Column 10)
	National Interest Test Statement The Productivity Commission has recently called for Australia to make the social and emotional development of school children a national priority. Suicide is the leading cause of death in young people, and suicide and self-inflicted injuries cost the national economy more than \$28 billion per year. The Prime Minister's National Suicide Prevention Taskforce has called for a systems approach incorporating cross-agency programs and linkages and improved decision-making tools to support a comprehensive approach to suicide prevention. This project aims to help schools and teachers throughout WA to improve their identification of vulnerable students and provide appropriate and timely support. It addresses mental health and wellbeing of young people and prevention of self-harm and suicidal behaviours, which have been identified as high priorities of governments and education systems across Australia.							
LP210100379 Mazzarol, Prof Tim W	The economic and social contribution of the Western Australian CME sector The first co-operative in Western Australia (WA) was founded in Albany in 1868. Since then, co-operative, and mutual enterprises (CMEs) have played a significant role in the development of the state. The evolution of the WA Co-operative and Mutual Enterprise (CME) sector was different from other states. Today, although comprising only 5.3% of the total CMEs in Australia, it has many of the largest and most successful firms. This study examines the unique aspects of the historical evolution of the WA CME sector, and its contribution to the state's economic and social development. It also examines the lessons that this offers for existing and future CMEs and the role of government policy and regulation in shaping both the past and the future.	137,930.00	128,930.00	128,930.00	0.00	0.00	395,790.00	COOPERATIVE FEDERATION OF WESTERN AUSTRALIA INC, CBH GROUP, CAPRICORN SOCIETY LIMITED, UNITED CRATE CO-OPERATIVE LTD, MOUNT BARKER CO-OPERATIVE LIMITED, WESFARMERS LIMITED, THE ROYAL AUTOMOBILE CLUB OF WA INC, YORK AND DISTRICT CO-OPERATIVE LIMITED
	National Interest Test Statement The Co-operative and Mutual Enterprise (CME) sector has played a significant role in helping to shape the economic and social landscape of WA, including the development of the fishing, farming, retailing, motoring services, insurance, and banking industries. However, relatively little attention has been given to research in this sector. The WA sector comprises around 105 enterprises representing a wide range of industries. In 2020 it had a combined annual turnover of \$10.73 billion and assets of \$16.4 billion. The sector employed more than 6,533 people and had over 2.6 million combined memberships. These businesses continue to provide vital services to the people of WA in both urban and regional areas, including indigenous communities. This research will showcase the contribution of this sector and provide lessons for existing firms and emerging ones, as well as offering guidance to government policy, whilst enhancing community awareness of the sector's role. The study will capture the story of the sector's history and preserve the historical records (e.g., documents and oral history) for future generations.							
LP210100386 Lowe, Prof Ryan J	Optimising artificial reef structures for nature-based coastal protection This project aims to develop a novel framework for predicting how artificial reef structures can be optimally designed to protect coastlines from erosion and flooding. It will develop new theory and models to quantify how waves interact with complex reef structures to reduce wave heights and extreme water levels at the shoreline. Expected outcomes include new practical tools and design guidelines that can be adopted by coastal engineers and managers to maximise coastal protection by reefs. This will boost Australia's capacity to protect populations and critical infrastructure from coastal hazards and support Australian industries to lead the international development of innovative nature-based coastal protection strategies.	138,180.00	164,180.00	131,180.00	0.00	0.00	433,540.00	SUBCON TECHNOLOGIES PTY LTD, DEPARTMENT OF ENVIRONMENT AND SCIENCE
	National Interest Test Statement As a coastal focused nation, Australia is particularly vulnerable to the economic and societal threats posed by coastal hazards, including sea level rise and extreme weather events. With public safety and hundreds of billions of dollars of infrastructure at risk, Australia must transform its interaction with, and reliance upon, the coast. Conventional 'grey' engineering solutions will not meet the needs of the future as they can substantively erode the amenities and resources provided by the coast. Australia urgently needs to develop novel coastal hazard mitigation solutions that will both effectively address the scale of the problem, while preserving (or even enhancing) the quality of its coastal environments. This project will deliver innovative approaches to design artificial reefs as a nature-based form of coastal protection, including developing new tools and guidelines for use by coastal engineers and managers. The project outcomes will boost Australia's capacity to respond to the imminent threats of climate change and position Australian industry to lead sustainable coastal protection solutions.							

Minister's Approval for Linkage Projects 2021 Round 1 for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program (Columns 1 and 2)	Approved Research Program (Column 3)	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)		Total (\$)	Partner Organisation(s)
		2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	(Column 9)	(Column 10)
LP210100397 Draper, A/Prof Scott	Efficiently unlocking full-scale WEC dynamics for industry cost reduction This project will reduce the cost of ocean wave energy, by uniting leading expertise from academia with cutting-edge know-how and full-scale data from industry to advance the way oceanic forces on wave energy converters are represented in industry models. These models are critical for designing and controlling the next generation of wave energy converters, which have larger motions than ever before. Carefully tested models will lead to better estimates of power production and loads, which will drive down the cost of wave energy and enable its large-scale utilisation. Broad communication of benefits and sharing of new knowledge will accelerate commercialisation of ocean energy in Australia and pave the way to meeting our future energy needs.	155,000.00	125,000.00	0.00	0.00	0.00	280,000.00	CORPOWER OCEAN, CLIMATE-KIC AUSTRALIA LTD
National Interest Test Statement Australia has the world's largest wave energy resource, sufficient to supply all of the country's energy needs. However, wave energy technology has not advanced to the point where this resource can be extracted economically. The industry's success and growth rest on improving power yield at a reduced cost. This collaborative project will accelerate the commercialisation of wave energy in Australia by bringing a leading international developer and their performance data into the Australian wave energy community to decrease the cost of these technologies. This is in line with Australia's policy on future energy and the blue economy; wave energy could power homes and businesses but also offshore facilities and remote sensing in Australia's vast exclusive economic zone. Energy from ocean waves and engineering expertise in this field have the potential to be export commodities for Australia. This project will strengthen Australia's research capacity in ocean energy and build its reputation as a global leader in this area.								
LP210100451 Batley, Prof Jacqueline	Engineering safer pastures for livestock This project aims to develop subterranean clover with elevated condensed tannins in leaves. This important pasture legume is currently a bloat risk for cattle and sheep due to low condensed tannins and high soluble proteins. Bloat is a health issue that costs the Australian and New Zealand livestock industries over \$200 million per annum. Condensed tannins can reduce bloat, decrease methane production and improve efficiency of production. A novel approach using CRISPR and other innovative molecular techniques will generate breeding lines high in condensed tannins and deliver knowledge applicable to other pasture legumes. Expected outcomes for livestock producers include improved animal welfare, reduced carbon emissions and enhanced profits.	231,708.00	237,770.00	242,555.00	245,646.00	0.00	957,679.00	PGG WRIGHTSON SEEDS
National Interest Test Statement Subterranean clover is the major pasture legume across southern Australia. It provides high quality livestock feed and biologically-fixed nitrogen to soil. However, cattle and sheep that graze pasture legumes can suffer life threatening health issues due to bloat. They also emit large amounts of methane, a potent greenhouse gas. Consumers are increasingly concerned about animal welfare and greenhouse gases. The Australian red meat industry is aiming for carbon neutrality by 2030, while the dairy industry has the goal of a 30% reduction. The project will address these issues by developing novel subterranean clovers with elevated condensed tannins to reduce the risk of bloat and methane emissions and increase feed utilisation. Project results will be applicable to other pasture legumes. The ultimate application is new cultivars to improve the animal welfare and environmental credentials of the red meat, dairy and wool industries and enhance productivity and profits of producers. The collaboration between UWA and PGG Wrightson Seeds provides an excellent opportunity for broad-scale outcome delivery and impact.								

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Approved Organisation, Leader of Approved Research Program (Columns 1 and 2)	Approved Research Program (Column 3)	Estimated and Approved Expenditure (\$)			Indicative Funding (\$)		Total (\$)	Partner Organisation(s)
		2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	2025-26* (Column 8)	(Column 9)	(Column 10)
LP210100458 Chooi, Dr Yit-Heng	Unleashing the Hidden Chemical Diversity in Australian Fungi This project aims to exploit an exclusive genomic resource consisting of >150 unique Australian filamentous fungi that has been built in a university-industry collaboration for genomic-guided biodiscovery. The genome sequence of these fungi revealed extensive hidden genetic instructions for production of novel biologically active molecules. The project will apply cutting-edge synthetic biology and chemical tools to tap into the hidden genomic potential of these Australian fungi. Expected outcomes of this project include new fine chemicals and lead molecules with desirable bioactivities. This will provide significant benefits to Australia's economy through the discovery of new pharmaceuticals, veterinary products and agrichemicals.	263,070.00	261,100.00	266,098.00	0.00	0.00	790,268.00	MICROBIAL SCREENING TECHNOLOGIES PTY. LTD.
National Interest Test Statement Fungi are prolific producers of molecules known as secondary metabolites (SMs), which exhibit a wide array of useful biological activities. Well-known examples of SMs include the antibiotic penicillins and the cholesterol-lowering statins, which have saved countless lives and positively impacted the course of human history. However, Australia's rich and unique fungal biodiversity has been largely unexplored to date, with recent genome sequencing pointing to a treasure trove of bioactive SMs waiting to be unlocked. This project will incorporate cutting-edge synthetic biology and biodiscovery tools developed in Australian academic labs into industrial microbial bioactive molecule discovery pipelines to unleash the hidden potential of Australia's unique fungal biodiversity. Outcomes from the project will provide significant economic returns to Australia through the discovery of new pharmaceuticals, veterinary products and agrichemicals, including next-generation antibiotics to combat the emerging threat of multidrug-resistant superbugs, and new herbicides and pesticides desperately needed by Australian farmers.								
The University of Western Australia		1,040,888.00	1,096,980.00	868,763.00	245,646.00	0.00	3,252,277.00	
Western Australia		1,568,871.00	1,586,870.00	1,472,842.00	483,245.00	0.00	5,111,828.00	
		7,687,641.00	7,888,478.00	7,275,813.00	1,448,580.00	153,000.00	24,453,512.00	