

Criteria for Proposals for Second Period National Science Challenges Funding

Pursuant to the Research, Science, and Technology Act 2010

General introduction

In August 2012, the Government agreed to the creation of the National Science Challenges policy. The Challenges are a set of mission-led science investments that will help to address some of the most fundamental issues New Zealand faces for its future development. The process of identifying the Challenges involved significant public engagement and recommendations by an independent National Science Challenge Panel.

Over 2014 and 2015 the Science Board made funding decisions for the 11 National Science Challenges for the first funding period ending 30 June 2019.

The Science Board will make funding decisions on proposals for these 11 National Science Challenges for the second funding period from 1 July 2019 to 30 June 2024.

Definitions

- **Additionality** - research, progress and impact generated by the collaborative, mission-led Challenge approach that would not otherwise have happened.
- **Mission-led science investments** - the funding of research, science, or technology or related activities directed at achieving a specific outcome.
- **Outcome** - the likely or achieved short- and medium-term effects of an intervention's outputs.
- **Related activities** - includes engagement with communities, schools, businesses and end-users of research to support/ensure technology transfer and uptake of research; capability development directly associated with the research planned; science communication and promotion; and providing for open access and reuse of data.
- **Relevant schedule** - the schedule that outlines the specific Challenge objective, themes and outcomes.
- **Science priorities** - areas of research, science, technology and related activities that the government has identified as key priorities, including the Primary Sector Science Roadmap and Conservation and Environment Science Roadmap.

Notice to the Science Board

1.1 In this notice, I:

- a. specify that the Science Board is to make funding decisions on proposals for National Science Challenges funding under section 10(3)(b) of the Research, Science, and Technology Act 2010 for the period 1 July 2019 to 30 June 2024; and
- b. set the criteria for the assessment of proposals for National Science Challenges second period funding for 1 July 2019 to 30 June 2024 under section 8(1) of the Research, Science, and Technology Act 2010.

General policy objective

2.1 The general policy objective of National Science Challenges funding is to fund research, science, or technology, or related activities that have the potential to:

- a. respond to the most important, national-scale issues and opportunities identified by science stakeholders and the New Zealand public;
- b. promote collaboration across a number of research providers and involve a broad portfolio of multi-disciplinary research activity;
- c. enable government to take a more long-term strategic approach to managing and coordinating mission-led science investments;
- d. complement other science priorities; and
- e. give effect to the Vision Mātauranga policy.

Vision Mātauranga policy

3.1 The Vision Mātauranga policy aims to unlock the science and innovation potential of Māori knowledge,

resources and people for the benefit of New Zealand. It focuses on four themes:

- a. Indigenous Innovation - contributing to economic growth through distinctive science and innovation;
- b. Taiao/Environment - achieving environmental sustainability through iwi and hapū relationships with land and sea;
- c. Hauora/Health - improving health and social well-being; and
- d. Mātauranga - exploring indigenous knowledge and science and innovation.

Science Board to make decisions on proposals for National Science Challenges funding

4.1 The Science Board will make funding decisions on proposals for National Science Challenges funding for the period 1 July 2019 to 30 June 2024 in accordance with the Research, Science, and Technology Act 2010.

4.2 In making funding decisions on proposals for National Science Challenges funding, the Science Board will allocate funds from the National Science Challenges appropriation in Vote Business, Science and Innovation.

4.3 The Science Board must make funding decisions on proposals for National Science Challenges funding in accordance with:

- a. the Public Finance Act 1989 and the relevant Appropriation Acts for Vote Business, Science and Innovation;
- b. the funding amounts and specific criteria as outlined in the relevant schedule of this notice (“the Relevant Schedule”); and
- c. the following general eligibility criteria and assessment criteria set out in clauses 5.1-6.2.

4.4 In making funding decisions on proposals for National Science Challenges second period funding, the Science Board must consider the Challenge’s future strategy and activities, informed by the Challenge’s performance over the first funding period, and take into account the amount of time the Challenge has operated to date.

General eligibility criteria for National Science Challenges funding proposals

5.1 For a proposal to be assessed against the criteria in clauses 6.1 and 6.2, the proposal must:

- a. be to undertake research, science, or technology, or related activities that are in a Challenge specified in the Relevant Schedule;
- b. be made under one Challenge as specified in the Relevant Schedule;
- c. meet any requirements specified in the Relevant Schedule;
- d. be made by a legal entity (based in New Zealand) representing a comprehensive range of organisations and individuals with a track record in the research area of the Challenge;
- e. not be made by or include a department of the public service as listed in Schedule 1 of the State Sector Act 1988;
- f. not be solely for the benefit of the applicant (which includes the organisations and individuals it represents);
- g. not be for capital expenditure;
- h. be for research, science, or technology, or related activities, the majority of which are to be undertaken in New Zealand, unless the Science Board considers that there are compelling reasons to consider the proposal, despite the amount of research, science, or technology, or related activities being proposed to be undertaken overseas;
- i. meet any applicable timing, formatting, system or other similar administrative requirements imposed by the Ministry of Business, Innovation, and Employment in supplying administrative services to the Science Board under section 10(7) of the Research, Science, and Technology Act 2010; and
- j. advise that the proposed funding recipient will, and the Science Board is of the view that it can, adhere to the terms and conditions of funding set out in an investment contract determined by the Science Board.

Assessment criteria for National Science Challenges funding proposals

6.1 A proposal that has been assessed as eligible for National Science Challenges funding under clause 5.1 must also be assessed having regard to whether:

- a. **The proposal is collaborative and responds to the most important, national-scale issues for New Zealand and the Challenge objective**

The Science Board must consider to what extent the Challenge's strategy for research, science, technology and related activities in the second funding period builds on the Challenge's activities in the first funding period to:

- provide a strategic, integrated and multidisciplinary portfolio of research, science, technology and related activities that meets the Challenge objective and outcomes (having reference to the themes), and the needs of end-users;
- build on and make best use of relevant New Zealand and international research, capabilities and user communities, including accessing funding and support from a range of sources; and
- give effect to the Vision Mātauranga policy in clause 3.1.

6.2 In doing this, the Science Board must have regard to the extent to which the proposal meets the following criteria:

a. The research, science, and technology will be of excellent quality

The Science Board must consider to what extent the Challenge's strategy for research, science, technology and related activities in the second funding period will deliver excellence, and builds on the Challenge's activities in the first funding period to:

- make best use of, and build the skills and expertise of New Zealand researchers to deliver the Challenge objective and outcomes (having reference to the themes), leveraging international researchers and research organisations, and allowing for the dynamic introduction of new capability, research and researchers;
- contribute to science quality, across a portfolio which appropriately balances high risk, high return research and new knowledge generation with incremental research and helping end-users to take up research (horizons balance), and appropriately balances science disciplines; and
- give effect to the Vision Mātauranga policy in clause 3.1.

b. The proposal is focused on delivering impact

The Science Board must consider to what extent the Challenge's strategy for research, science, technology and related activities in the second funding period will deliver impact, and builds on the Challenge's activities in the first funding period to:

- realise a credible pathway to create the impacts necessary to achieve the Challenge's objectives and outcomes (having reference to the themes);
- deliver benefits and additionality to New Zealand and to New Zealand science; and
- give effect to the Vision Mātauranga policy in clause 3.1.

c. Decision-making and accountability arrangements are sound and enduring

Based on the Challenge's performance during the first funding period and any proposed changes, the Science Board must confirm that the Challenge's governance, management, and financial structures, including decision-making and accountability arrangements, are effective, appropriate and give effect to the Vision Mātauranga policy in clause 3.1.

Revocation of Previous Notices

7.1 I hereby revoke the following notices:

1. The notice titled "Criteria for Proposals for National Science Challenges Funding" published as a supplement to the [New Zealand Gazette, 1 October 2013, No. 135, page 3701](#);
2. the notice titled "Criteria for Proposals for National Science Challenges Funding" published as a supplement to the [New Zealand Gazette, 31 January 2014, No. 12, page 285](#); and
3. the notice titled "Amendment to Criteria for Proposals for National Science Challenges Funding" published in the [New Zealand Gazette, 15 January 2015, Issue No. 3, Notice No. 2015-go250](#).

Dated at Wellington this 21st day of August 2017.

HON PAUL GOLDSMITH, Minister of Science and Innovation.

Schedule 1: Resilience to Nature’s Challenges: Kia Manawaroa - Ngā Ākina o Te Ao Tūroa**1. Objective**

1.1 This Challenge will enhance New Zealand’s resilience to natural disasters.

2. Funding

2.1 The Science Board may allocate no more than \$59.4 million (excluding GST) for Resilience to Nature’s Challenges: Kia Manawaroa - Ngā Ākina o Te Ao Tūroa across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Resilient society	Natural hazards risks are better understood and managed, reducing vulnerability and improving response and recovery.
Resilient buildings and infrastructure	Losses due to building and infrastructure damage or failure are avoided and minimised.
Risk assessment	Cost effective mitigation measures are in place across all natural hazards, and residual risk is managed effectively.
Geological hazards	The ability to avoid and minimise losses due to geological hazards is improved.
Weather hazards	The ability to avoid and minimise losses due to weather hazards is improved.
Fire hazards	The ability to avoid and minimise losses due to fire hazards is improved.

Schedule 2: High-Value Nutrition: Ko Ngā Kai Whai Painga**1. Objective**

1.1 This Challenge will develop high-value foods with validated health benefits to drive economic growth.

2. Funding

2.1 The Science Board may allocate no more than \$83.8 million (excluding GST) for High-Value Nutrition: Ko Ngā Kai Whai Painga across the first and second funding periods.

3. Specific assessment criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Clinical application (what food to do what)	Health targets are identified that are amenable to a science evidence-based solution to drive economic growth.
Biomarkers (measuring impact, clarifying risk)	New Zealand science provides authoritative leadership and capability on validated biomarkers for human health.

Meeting consumer references and health values	Profitable high-value food products are produced and marketed backed by scientifically validated health claims.
Science of food	The biological delivery of safe, efficacious and acceptable food products to consumers is enabled, regardless of target export market.

Note: Food is defined as food and beverage for human consumption.

Schedule 3: The Deep South: Te Kōmata o Te Tonga

1. Objective

1.1 This Challenge will understand the role of the Antarctic and southern ocean in determining our climate and our future environment.

2. Funding

2.1 The Science Board may allocate no more than \$51.1 million (excluding GST) for The Deep South: Te Kōmata o Te Tonga across the first and second funding periods.

3. Specific assessment criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Processes, uncertainties and tipping points, including detection and attribution	The fundamental science, essential for robust “predictions/projections of change”, is identified and prioritised to fill current knowledge gaps.
Predictions/projections of change	Predictions/projections for the “consequences of change” are improved.
Consequences of change: adaptable, responsive and resilient New Zealand	The critical role that the Antarctic and southern ocean have in our social, cultural and economic wellbeing and implications for active kaitiakitanga are well understood by New Zealanders. Knowledge of how our environment will change (incorporating risk and uncertainty) contributes to the development of appropriate policy and adaptation plans and is implemented through our decisions as New Zealanders.

Schedule 4: New Zealand’s Biological Heritage: Ngā Koiora Tuku Iho

1. Objective

1.1 This Challenge will protect and manage our biodiversity, improve our biosecurity and enhance our resilience to harmful organisms.

2. Funding

2.1 The Science Board may allocate no more than \$63.7 million (excluding GST) for New Zealand’s Biological Heritage: Ngā Koiora Tuku Iho across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided

there are reasons for their inclusion.

Themes	Outcome statements
Discovery and characterisation	New Zealand’s indigenous and introduced biodiversity are sufficiently understood across a range of scales and knowledge systems to inform the design of a world-leading system for prioritising biosecurity and biodiversity management.
Interdependencies, functions, ecosystems and resilience	Management for resilience of our indigenous and introduced ecosystems is supported by understanding the linkages between biodiversity, evolution, ecosystem function and services, mātauranga Māori and environmental and economic pressures.
Mitigation and restoration	New Zealand has diverse and vibrant indigenous and introduced ecosystems across a range of scales. Responses to economic and environmental drivers (threats and risks) are balanced to support kaitiakitanga and ensure long-term sustainability.
Detection, measurement and assessment	New Zealand has quantitative and qualitative measurement and assessment tools, integrated across the biosecurity and biodiversity domains and consistent with international best practice/standards, to enable the understanding, monitoring and evaluation of status and trends of biodiversity and the impacts of invasive organisms.
Social partnerships and licence	Social partnerships with motivated and enabled citizens, scientists, kaitiaki and decision makers are built, providing the basis for a social licence to apply new management methodologies, tools, technologies and solutions.

Schedule 5: A Better Start: E Tipu e Rea

1. Objective

1.1 This Challenge will improve the potential of young New Zealanders to have a healthy and successful life.

2. Funding

2.1 The Science Board may allocate no more than \$34.7 million (excluding GST) for A Better Start: E Tipu e Rea across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Maternal health, pregnancy and early childhood	New and existing knowledge is used to understand embryonic, perinatal, infant and child development and the intrinsic and extrinsic factors that impact upon the developmental processes to determine future overall well-being to inform evidence-based interventions.
Successful transition into healthy adulthood	Our understanding of human behaviour is enhanced using new and existing knowledge, including the links between the relevant genes and the physical and socio-economic environment, allowing the development of interventions to manage risk, improve health and educational outcomes, and promote resilience in our population.

Education, living in the digital world	<p>New and existing knowledge is used to understand the different world in which our children are growing up, and our parenting, educational and employment practices adapted to optimise health, well-being and productivity.</p> <p>The possibilities offered by digital technologies are built on to create a more interactive learning experience for our children, to instil a fascination for science, and to enhance learning and development.</p>
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Note: Developmental is intended to be inclusive, including neurological, physical, psychological, cognitive and social development.

Schedule 6: Ageing Well: Kia eke kairangi ki te taikaumātutanga

1. Objective

1.1 This Challenge will harness science to sustain health and well-being into the later years of life.

2. Funding

2.1 The Science Board may allocate no more than \$34.9 million (excluding GST) for Ageing Well: Kia eke kairangi ki te taikaumātutanga across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Maintaining brain health	The number of older people requiring residential care due to cognitive and other neurodegenerative deficits, including those resulting from strokes, is reduced.
Dealing with physical frailty	Older people maintain more independent mobility later in life with reduced osteoarthritis and fracture rates, reduced hospital re-admissions, and increased physical activity.
Enhancing the role of older people in society	Older people have increased engagement and a sense that their roles and contributions are valued and supported within their culture and communities.

Schedule 7: Healthier Lives: He Oranga Hauora

1. Objective

1.1 This Challenge will reduce the burden of major New Zealand health problems.

2. Funding

2.1 The Science Board may allocate no more than \$31.3 million (excluding GST) for Healthier Lives: He Oranga Hauora across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Prevention	Disease in New Zealanders is prevented and reduced through high quality scientific evidence indicating which health interventions should be effective for equitable outcomes.
Innovation in health delivery, diagnostics and therapies - “the right treatment for the right patient”	The diagnosis and treatment of obesity, diabetes, cancer and cardiovascular disease are improved to reduce their negative impacts on New Zealanders for equitable outcomes.
Population, cultural, and social factors	Emotional, behavioural, cultural, social, educational and economic considerations specific to New Zealand have underpinned the science thinking of the two themes above, resulting in equitable approaches to reducing the burden of major New Zealand health problems.

Schedule 8: Science for Technological Innovation: Kia kotahi mai - Te Ao Pūtaiao me Te Ao Hangarau

1. Objective

1.1 This Challenge will enhance the capacity of New Zealand to use physical and engineering sciences for economic growth.

2. Funding

2.1 The Science Board may allocate no more than \$106 million (excluding GST) for Science for Technological Innovation: Kia kotahi mai - Te Ao Pūtaiao me Te Ao Hangarau across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Materials, manufacturing and design	A wide range of new or enhanced materials and technological processes are developed that enable industry to advance new or enhanced products, services and processes.
Sensors, robotics and automation	A wide range of new or enhanced sensors and sensing technologies are developed and are implemented in a variety of new or enhanced products or applications. Robotics and automation are applied to a wide range of applications to reduce costs, improve efficiencies, enhance safety in environments dangerous to humans and undertake tasks not otherwise economically viable.
IT, data analytics and modelling	A wide range of new or enhanced hardware components and systems and software applications are developed that enable industry to incorporate them into new or enhanced products and services.

Schedule 9: Sustainable Seas: Ko ngā moana whakauka

1. Objective

1.1 This Challenge will enhance utilisation of our marine resources within environmental and biological constraints.

2. Funding

2.1 The Science Board may allocate no more than \$71.1 million (excluding GST) for Sustainable Seas: Ko ngā moana whakauka across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Characterising our ocean	An integrated temporal and spatial baseline of biological and physical resources, as well as human activities, is established. This provides a basis for understanding the dynamics, sensitivities and resilience of ocean and coastal systems.
Understanding the dynamics and sensitivities of ocean and coastal systems	The interconnectedness between ocean systems, including human activities, is understood to enable adaptation and mitigation of impacts of change.
Towards effective integrated management of oceans and coasts considering environmental, societal, cultural, Māori and economic concerns	The evidence base to inform and develop management and policy frameworks is enhanced to optimise the sustainable use and resilience of coastal and ocean resources within societal, cultural, Māori and economic values, rights and interests.

Schedule 10: Our Land and Water: Toitū te Whenua, Toiora te Wai

1. Objective

1.1 This Challenge will enhance primary sector production and productivity while maintaining and improving our land and water quality for future generations.

2. Funding

2.1 The Science Board may allocate no more than \$96.9 million (excluding GST) for Our Land and Water: Toitū te Whenua, Toiora te Wai across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Defining and meeting social values	Society has confidence in New Zealand’s primary production systems because they meet the social, environmental, cultural, Māori and economic requirements of New Zealanders and their markets, including maintenance and improvement of their land and water quality.
Optimising primary sector supply chains	Technical barriers, and other barriers are identified and overcome (if science can address these), and product performance requirements are met to optimise value to New Zealand’s primary producers and processors, and consumers.

Land and water management	The functions and environmental limits of land and water systems are sufficiently understood and defined within societal, cultural, Māori and economic values, rights and interests and incorporated into sustainable production systems.
Adaptable, responsive and resilient land-based primary production systems	Sustainable productive capacity and profitability are ensured, by developing and adopting tools, technologies and systems that support a flexible and responsive primary industry.

Schedule 11: Building Better Homes, Towns, and Cities: Ko ngā wā Kāinga hei whakamāhorahora

1. Objective

1.1 This Challenge will improve the quality and supply of housing and create smart and attractive urban environments.

2. Funding

2.1 The Science Board may allocate no more than \$47.910 million (excluding GST) for Building Better Homes, Towns, and Cities: Ko ngā wā Kāinga hei whakamāhorahora across the first and second funding periods.

3. Specific eligibility criteria

3.1 To be eligible for funding under this Challenge the applicant must:

- a. have received first period funding for this Challenge;
- b. provide a proposal for research, science, and technology, or related activities that:
 - i. is focused on achieving outcomes that will contribute to the overall objective for the Challenge;
 - ii. has regard to the “themes” and “outcomes” in the table below; and
 - iii. may include different themes and/or outcomes that can better meet the Challenge objective, provided there are reasons for their inclusion.

Themes	Outcome statements
Improved housing stock	Houses are of better quality and are cost-effective.
Meeting future demand for affordable housing	New, affordable housing is developed and located to match current and future demand of different demographic groups.
Vibrant communities and cities for residents and businesses	Better current and future urban environments encourage economic activity and improve residents’ well-being.
Uptake of innovation and productivity improvements	The building sector adopts innovation and techniques to improve productivity.
Future land information systems	Better systems make for improved land-use decisions.

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