

SEED PROJECTS: 2017 CALL FOR PROPOSALS (CfP)

Objectives of the Seed Project Fund

The seed projects are intended to bring in new ideas and expand the number of researchers in the SfTI community. The process is designed to balance the top-down approach used to define the initial spearhead projects, which sit under portfolios. We are using a bottom-up process – an open call for projects - to initiate up to approximately 15 seed projects this year. The seed projects may involve only a single Science Leader, perhaps with a Postdoc, PhD or Master’s researcher, and this round may run for up to two years.

The background and objectives of the Challenge are outlined in Appendix 2.

We are looking for Seed Projects that have the following characteristics:

- Propose clever stretch science (including social science) and risky new ideas, address a potentially disruptive technology area, and have potential for implementation in New Zealand in the longer term
- Alignment with one or more of the SfTI science / technical Theme areas
- In this round IT, Data Analytics and Modelling (ITDAM) aligned proposals will be given high priority - our target is to get between one third and half of the proposals in the main ballot having strong ITDAM alignment
- Bring in new researchers or new ideas to the Challenge; especially where the PI is an emerging researcher* pursuing their own independent research
- Include clear plans for building Māori research capacity and capability (for consideration under Vision Mātauranga priority)
- Are at the scientific and/or technological proof of concept stage, or developing initial prototypes
- Make a strong case for the New Zealand context and niche, and likely strong contribution to NZ economic growth if successful
- Contain a strong research plan
- Researchers agree to participate in capacity development initiatives and ideally can show evidence of being active in capacity development
- Researchers show willingness to seek and accept advice on the project direction from mentors e.g. business or end-users
- Has long-term potential and may have the potential to develop into a future spearhead (larger) project.

All funding will be contracted to end before 30 June 2019, i.e. 2 years’ funding is available.

Compulsory stage-gates will be expected on all projects at around 12 months into the contract.

*Note: an emerging researcher is someone who has spent a maximum of 7 years full-time equivalent in an active research role after completing their highest research degree.

Indicative funding 2017

Total Funds (NZ\$)	Indicative funding per proposal	Term
\$2,700,000 over 2 years	Up to \$100,000 per year (smaller projects are welcome)	Up to 2 years (All funding will be contracted to end before 30 June 2019)

- all funding figures exclude GST
- at least 20% of total funding will be committed to projects that support Vision Mātauranga objectives
- anticipated funding – approximately 15 projects.

Eligibility

- New Zealand based research organisations, with research capability relevant to the mission, objectives, scope and research domains of Science for Technological Innovation.
- The project (or a close variation) cannot be already funded by MBIE or another funding agency and any parallel application(s) must be declared in the proposal.
- Named Researchers already contracted with SfTI research projects are not eligible to submit a proposal, receive Seed funding, or be named as a member of a Seed project team.
- A person can be involved in a maximum of two proposals per year, including a maximum of one as a Principal Investigator.

Key Dates

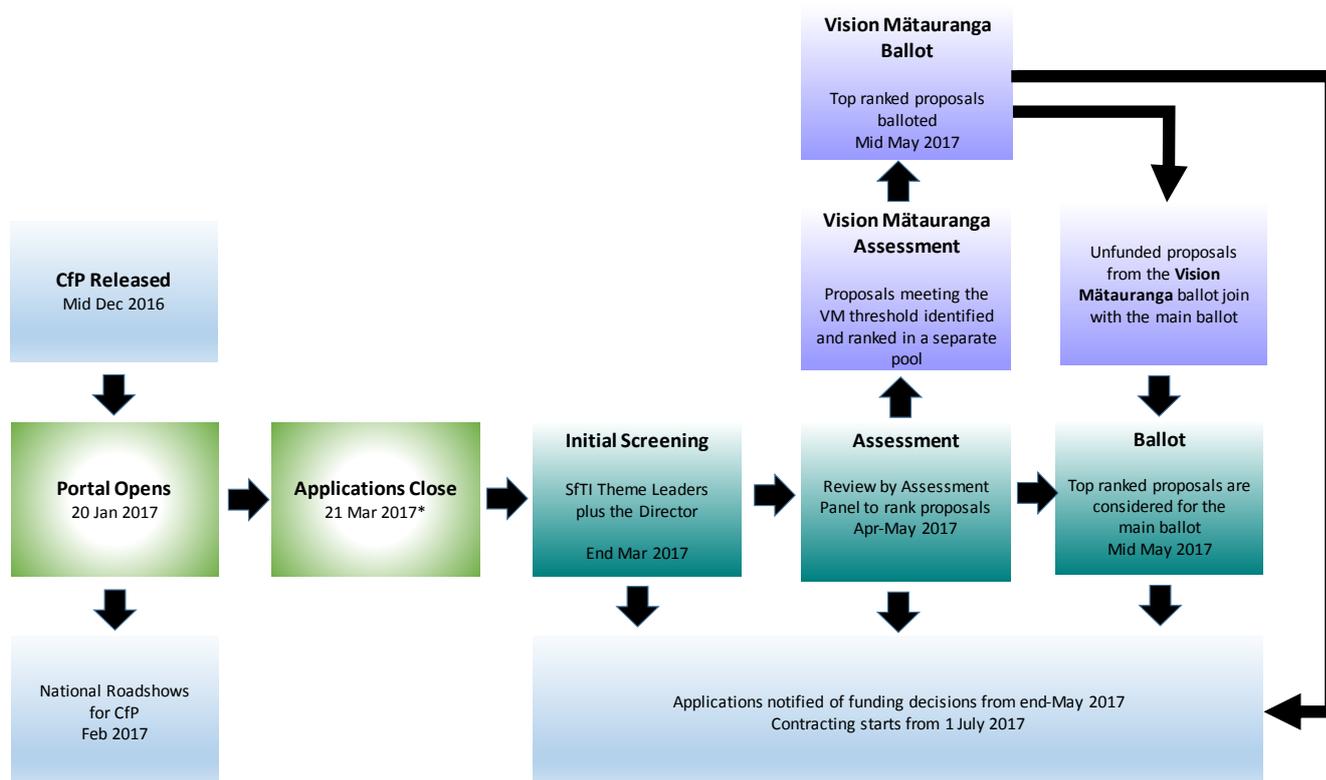
Timeline	Key Dates
2017 CFP released	mid December 2016
Portal opens	20 January 2017
National roadshows for CFP	early February 2017
Applications close	21 March 2017
Initial screening including eligibility	end March 2017
Assessment of proposals	April to mid-May 2017
Successful applicants notified and contract negotiations begin	end-May 2017
Projects start	as soon as possible from 1 July 2017
Contract completion date	30 June 2019

SfTI Seed Projects Webpage:

<http://www.sftichallenge.govt.nz/research/seed-projects>

Assessment process

The following diagram details the steps in the SfTI Seed Project application and assessment process:



* Please note – Applications close on 21 March 2017 not 20 March 2017

The seed project investment mechanism is a single-stage process; full proposals are submitted for assessment. It is fully contestable and open to applicants that meet the eligibility criteria.

Relative to the 2016 Seed Project funding round, greater priority will be given this year to proposals led by emerging researchers and proposals aligned to the ITDAM theme.

The key assessment criteria to be used by the assessment panel in assessing 2017 proposals are:

	Assessment Criteria	Importance
1	Novel and innovative idea, high quality science aligned with SfTI themes	Very High
2	Strong alignment with Vision Mātauranga	High
3	Strong alignment with ITDAM themes	High
4	Led by emerging researchers	High
5	Potential contribution to NZ's economic growth and justification of the NZ context and niche	Medium
6	Likelihood research objectives will be achieved (good research plan, apt critical steps, appropriate team)	Medium
7	Well-defined links to business and/or capacity development initiatives	Low
8	Other favourable characteristics (e.g. provider collaboration)	Low

In the assessment of Seed Projects for Vision Mātauranga alignment we will be looking for the following:

Kaupapa (The What)

- Does the proposal have the capacity to meet any of the four Vision Mātauranga areas?
- Will the proposal contribute to te Ao Māori and Vision Mātauranga?
- Does the proposal have the potential for novelty or opportunity by integrating science and technology and mātauranga Māori?
- Will the proposal enhance Māori quadruple bottom lines (i.e., economic, social, environmental, cultural)?
- Will products or services be developed that will be of particular benefit to Māori? Will Māori be able to access these products or services easily?
- Is intellectual property likely to be discovered that will be of particular benefit or interest to Māori?
- Will the proposal have intergenerational impacts (i.e. benefits and risks) for Māori beyond the life of the challenge and are these acknowledged?

Tikanga (The How)

- How the proposal manages risk (if any) to te Ao Māori. This might include: knowledge asymmetry, consultation 'fatigue', resourcing for 'stakeholders',
- The effectiveness of how the findings of the proposal will be communicated to Māori.

Ngā Tangata (The Who)

- The extent to which Māori capacity and capability is developed or utilised (i.e, Māori are able to meaningfully contribute to the proposal as researchers, collaborators, knowledge holders etc).
- The resource (human, infrastructure, financial, time) that is set aside to ensure the Vision Mātauranga component can be maximised.
- That the appropriate networks and relationships are established to maximise the opportunities of the proposal.

In deciding who to fund, the assessment process will be undertaken in 4 phases:

Phase 1: Initial Screening by the SfTI Management Team

The initial proposal screening will be carried out by the four Challenge Theme Leaders plus the Director. This is to ensure proposals meet the eligibility criteria, to identify any proposals clearly not fundable, and to review and assess the alignment of proposals received to the Challenge themes.

Phase 2: Review by an Assessment Panel

All eligible proposals will be reviewed by an assessment panel of 9 - 10 members. Panel members will include all Theme leaders from the Challenge Management team, 4 - 5 external panel members, and an external, independent Chair. The panel members will be announced on the Challenge website before proposals close.

The assessment criteria and indicators of importance will be used to inform determination of the overall ranking for each of the proposals. Proposals will be divided into 3 categories:

- category 1: high-quality proposals meeting the assessment criteria (certain to be included in the ballot)
- category 2: proposals with some weaknesses
- category 3: proposals with major deficiencies.

Proposals with sufficient Vision Mātauranga alignment will be identified for consideration in the Vision Mātauranga pool.

The panel will also consider the funding requested by each proposal and may decide to only support allocation of a smaller amount, if the proposal is selected in the ballots.

Phase 3: Vision Mātauranga Ballot

The top ranked proposals in the Vision Mātauranga pool will be selected for the Vision Mātauranga ballot. The number of proposals selected for the ballot will be the maximum of:

- all proposals in the Vision Mātauranga pool assessed as category 1 proposals OR
- the top proposals in the Vision Mātauranga pool to a combined value of 20% of the available funding.

The Challenge reserves the right to select fewer proposals for the Vision Mātauranga ballot if proposals received are not of sufficient quality. Proposals will be randomly drawn from the ballot pool until approximately 20% of total funding has been reached or all proposals in the ballot are selected. Unfunded proposals from the Vision Mātauranga pool will join the pool for consideration to enter the main ballot.

Phase 4: Main Ballot

The top ranked proposals (excluding those funded in the Vision Mātauranga ballot) are considered for the main ballot. The number of proposals selected for the ballot will be the maximum of:

- all proposals assessed as category 1 proposals
- the top ranked proposals to a combined value of 100% of the available funding.

The Challenge reserves the right to select fewer proposals for the main ballot if proposals received are not of sufficient quality. Ballot draws will continue until the budgeted funding is allocated or all proposals in the ballot are selected.

Application process

Submitting your Proposal

All applications must be submitted through the Callaghan Innovation IMS Portal (the portal) by 21 March 2017. The portal will be open from 20 January 2017.

The following link will take you to the portal <https://ims.callaghaninnovation.govt.nz/myfirst/>

To access the portal, you will require a username and password:

- If you have not used the portal before, you will need to apply for access via your organisation's Research Office
- If you already have access to the portal but wish to change details, contact: SeedProjectsSfTIChallenge@callaghaninnovation.govt.nz

Some notes when using the portal:

- When the portal opens select the correct investment process - **2017 NSC Science for Technological Innovation Seed Projects** - and 'create' an application
- Ensure you have your information prepared – please refer to the guidance notes below in Appendix 1
- You need to create a single application in the portal for each proposal you are submitting
- You may amend or withdraw your response at any time prior to the closing date. To withdraw an application, notify SeedProjectsSfTIChallenge@callaghaninnovation.govt.nz and identify the application to be withdrawn
- When the application is complete ensure it is submitted (not merely created) before the closing date. Once it is submitted it cannot be edited. To access a submitted response (before the closing date) email SeedProjectsSfTIChallenge@callaghaninnovation.govt.nz
- The Challenge may not acknowledge the submission of responses or the withdrawal of any response. To understand if your proposal has been submitted or not, your proposal will display one of the following statuses in the portal:

Submitted to IMS – means your application has been received

Submitted for QA - means you do not have the rights for the organisation to submit an application for funding. Contact your Research Office or the SfTI seed project email

In Progress – means your application has not been submitted and not been received by the Challenge

Not Progressing or Not Submitted – means the application has been withdrawn (and will not be evaluated)

Guidelines for preparing your proposal are detailed in Appendix 1. This includes brief, explanatory statements about what information is required.

Feedback

Applicants will receive indication of their funding category and brief feedback based on the panel's comments, subject to accepting the funding decision as final.

Contracting and Reporting Process

Contracts

If your proposal is successful, the host organisation of the contact person will be responsible for signing a contract with SFTI. The administration contact on the research proposal is through the institution's research office. A standard contract template has been agreed between the Challenge's partner institutions.

The host organisation of the Science Leader will be responsible for the fulfilment of the contract, and is required to guarantee that resources and research time are available.

Projects will be contracted to end by 30 June 2019 at the latest i.e. up to 2 years' funding is available.

Stage-gates will be expected on all projects at around 12 months into the contract.

Wherever possible, contracts will be based on the information contained in the proposal.

Reporting

A contract requirement will be the submission of written reports describing the progress of the research.

- **Annual reporting** linked to the information supplied in your proposal including:
 - status reporting
 - delivery of critical steps
 - budget reporting
 - reporting against the Challenge KPIs.
- **Exception reporting may be requested** where required detailing:
 - Progress and completion of stage-gate deliverables
 - if stated critical steps are missed
 - any significant risks and issues that arise that will affect achievement of the project objectives
 - significant deviations from the contracted expenditure breakdown
 - if appropriate, the proposed revised research plan.
- **A final report** at the end of the project providing an overview of what the project achieved including:
 - what went well / didn't go well in the project
 - key results and outcomes of the project
 - what is the future for the research?
 - reporting against the Challenge KPIs.

Confidentiality

The Challenge will treat your proposal as confidential, but you should be aware that the Challenge is subject to the Official Information Act 1982 and maybe required to release information supplied in your proposal in accordance with that Act, or as otherwise required by law.

If your proposal contains confidential or sensitive material, please indicate this at the start of the "summary" section of your proposal.

Conflicts of Interest

Any conflicts of interest you are aware of should be noted in your proposal, including the reason why you consider them conflicts. Conflict could include both Challenge members and the assessment panel members. The Challenge will post a list of assessors on the Challenge website.

Conflicts may occur at various levels:

- direct conflicts – when an assessor is directly involved with a proposal (as a participant, manager, mentor or partner) or has a close personal relationship with you (e.g. a family member);
- indirect conflicts – when an assessor is employed by an organisation involved in your proposal, or when an assessor has a personal or professional relationship with you (e.g. an acquaintance);
- if an assessor has an involvement (direct or indirect) with a proposal in direct competition with your proposal or where the outcomes proposed by your proposal may compete with the assessor's business interests.

Both the Challenge proposal assessment group (Director plus theme leaders) and the main assessment panel will operate a Conflicts of Interest register and a member may be excluded from assessment of a proposal for which they have a significant Conflict of Interest.

SfTI Seed Project Contact Details

SfTI Seed Project contact details:

Email: SeedProjectsSfTIChallenge@callaghaninnovation.govt.nz

APPENDIX 1: Application Form and Guidelines for Completing Proposals

This section describes what information is required for your proposal in the Investment Management System (IMS) Portal and is intended for use in preparation of your National Science Challenge Science for Technological Innovation Seed Project funding application.

For information about your Application or help with the portal please email: SeedProjectsSFTIChallenge@callaghaninnovation.govt.nz

Formatting Guidelines

Please follow these rules when filling in the application form:

- Typeface size: 11-point in the word doc uploads
- Font: Arial
- Spacing: single-spacing
- Margins: 2 cm on either side of the page
- CVs in standard RSNZ format (5 pages maximum each, with both Part 1 and Part 2 completed)
- No additional attachments except where requested.

Content

In the preparation of your application, please ensure that the following key elements of your proposal are fully addressed / included:

- its alignment with SFTI theme/s
- the novelty and potential of the idea
- justification of the New Zealand context and niche
- a detailed research plan including critical steps, stage-gates and timeline
- details of the research team competencies, track record, including any industry or end-user mentor/buddy or collaborators
- any planned capacity development initiatives
- the budget and justification of the funding sought.

What characteristics do we consider makes a “Good” application?

- concise wording
- a strong focus on alignment with the assessment criteria
- clear descriptions of the science novelty and/or stretch
- clear descriptions of measurable critical steps and stage-gates
- no unnecessary padding or jargon

Audiences

The title and summary sections will be made publicly available if your proposal is funded, and so should be in plain language and contain no confidential information; the *Background and Overall Aim* section should address an audience with a general understanding; the *Proposed Research* section should address assessors with broad scientific knowledge rather than specialists in the field.

Seed Projects Application Template Outline and Guidelines

SECTION 1: APPLICANT INFORMATION	
Contracting Organisation:	<ul style="list-style-type: none"> The Contracting Organisation is the organisation that will be responsible for the signing of any Funding Agreement should this Application be successful. This information is pre-populated based on the selection at time of creating an application. It is not editable.
Postal and Courier address	<ul style="list-style-type: none"> This information is prepopulated based on the Contracting Organisation, it is not editable. If there are changes required, please email: investmentsupport@callaghaninnovation.govt.nz.
Total Funding Requested:	<ul style="list-style-type: none"> This section is populated automatically from the Requested Funding sub-section (2.3)
Project Short Title:	<ul style="list-style-type: none"> No more than 10 words This will be made publicly available if funded
Investment Mechanism:	<ul style="list-style-type: none"> Please select "Seed Project" from the drop-down list
Number of years' Funding Requested:	<ul style="list-style-type: none"> Up to 2 years
Alignment with Challenge Theme areas: (Primary and Secondary)	<ul style="list-style-type: none"> Please indicate which SfTI Theme your proposal is primarily aligned to, and any secondary theme(s) All proposals must be aligned with one or more of the following SfTI science/technical Theme areas: <ul style="list-style-type: none"> Materials, Manufacturing and Design Sensors, Robotics and Automation IT, Data Analytics and Modelling (ITDAM) In addition to the science/technical themes above, proposals may indicate secondary alignment to: <ul style="list-style-type: none"> Vision Mātauranga Building NZ's Innovation Capacity (Portfolio 1) <p>Details of the SfTI Themes are in the CfP above.</p>

SECTION 2: RESEARCH PROPOSAL	
SUBSECTION 2.1: RESEARCH PROPOSAL	
a) Summary (maximum 250 words)	<ul style="list-style-type: none"> Summarise your proposed research project using plain language, but without over-simplification A structured or semi-structured abstract covering background/context, science stretch and question, methods, and potential science and economic impact, would be effective This summary will be made publicly available should your proposal be successful If your summary contains confidential or sensitive material, please indicate at the summary start.
b) Proposed Research (Approximately 3 pages in length – refer to word limit guidelines - excluding up to up to 1 page of references)	<p>Upload a document providing details on your research proposal.</p> <p>You must include the following headings:</p> <ul style="list-style-type: none"> Background / Context - provide context by detailing the state of knowledge in this field (400 words maximum) Aims and Objectives - the overall goal and specific aims/objective(s) of the research (in bullets – 300 words maximum)

SECTION 2: RESEARCH PROPOSAL

SUBSECTION 2.1: RESEARCH PROPOSAL

	<ul style="list-style-type: none">• Science Stretch and Novelty (300 words maximum)• Potential Contribution to NZ Economic Growth and Links to NZ Businesses - how the research aligns to the assessment criteria detailed in the CfP, including justification of the New Zealand context and niche (300 words maximum)• Detailed Methodology - the research plan (detailed methodology) – the hypothesis/ses being tested, methodology being used, methods of analysis (this should cover the total funding period and include contributions from collaborators, etc.) (1000 words maximum)• possible future work if this project is successful. <p>(Refer to the formatting guidelines above)</p>
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SUBSECTION 2.2: CRITICAL STEPS, STAGE-GATES AND TIMELINE

a) Critical Steps, Stage-gates and Timeline (600 words maximum)	<p>Input the research goals and specific aims/objectives for the project in the following format to match the portal:</p> <ul style="list-style-type: none">• only one impact statement –enter the overall goal of your project (maximum 20 words)• research aims – state the specific aim(s)/objective(s) of the proposed research (these should match those stated in Section 2.1b above)• critical steps/stage gate – state the specific achievements needed to meet each research aim/objective• due dates for each critical step/stage gate <p>These critical steps will form the base for part of your annual and exception reporting requirements if your proposal is successful.</p> <p>One of your critical steps should be identified as a stage-gate.</p> <p>Measurable critical steps/stage gates should be included in your proposal and these will be confirmed at contracting.</p>
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SUBSECTION 2.3: ALIGNMENT AND RELATIONSHIP WITH OTHER WORK

a) Alignment with the Challenge (maximum of 300 words)	<ul style="list-style-type: none">• Describe the relation between the proposed research and the Challenge Themes and other research teams and projects within the Challenge.
b) Relationship with other work (maximum of 300 words)	<ul style="list-style-type: none">• Indicate whether other funding has been received or applied for, for this research or for research relevant to this proposal - e.g. MBIE, Marsden, CoRE• Provide details of the relation between this research and other work being undertaken elsewhere - the proposal should demonstrate this research is novel, and will not be funded if funding is already in place for this or closely related research.

SUBSECTION 2.4: REQUESTED FUNDING BY YEAR

Requested Funding by year	<ul style="list-style-type: none">• Enter the amount of funding for each year of your research project. Year 1 \$000 ex gst Year 2 \$000 ex gst
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SECTION 3: VISION MĀTAURANGA

- How does the research give effect to Vision Mātauranga, including benefits to NZ and Māori (iwi, communities/groups and/or businesses)?
- If your research is of relevance for Māori, or involves Māori, outline the steps you have taken to identify research opportunities relevant to Māori interests, including te reo Māori, how Māori have been or will be engaged, what Māori innovations/bodies of knowledge you will draw from and integrate into the research and what Vision Mātauranga outcome benefits are envisioned
- VM should be given serious consideration on all proposals, but it is not compulsory. Only confirmed VM alignment or actions should be included in your submission.
- Please refer to the CfP for further information of what we will be looking for in Vision Mātauranga proposals
- enter text to a maximum of 600 words.

SECTION 4: RESEARCH TEAM AND CAPACITY DEVELOPMENT

SUBSECTION 4.1: PROJECT TEAM

Project Team

- Provide the annual full-time equivalent (FTE) commitment to the project for each person listed (one entry per person). The Science Leader / Principal Investigator roles are needed as a minimum.
Significant FTE is needed for science leaders.
Supervision of postgraduate students should not be included in the FTE.
- Please provide CVs of all named researchers in standard RSNZ format (both Part 1 and Part 2 should be completed)
CVs should not be included for researchers with no FTE.
- Key researchers and individuals are critical to the success of the project. They may be from the contracted organisation or a sub-contracted organisation
- Include all remaining FTEs not listed elsewhere in a cumulative total under 'Other'. (If they are yet to be appointed list as "Unnamed" in the name field.)
- Within the portal, the project roles available are:
 - Science Leader (Principal Investigator)
 - Key Researcher (Associate Investigator)
 - Post-Doctoral Researcher / PhD Student / Master student / Student
 - Contact Person
 - Other

SUBSECTION 4.2: ROLES AND RESPONSIBILITIES

a) Roles and Responsibilities (maximum of 500 words)

- Clearly explain the role of each team member, including details of their research expertise and contribution that each named team member will make to the proposed research project
- Include details of any industry or end-user mentor/buddy
- Include details of any sub-contractors
- Include details of the time involvement of all personnel – including sub-contractors:
 - their name (or unnamed if yet to be appointed)
 - their role in the project (researcher, mentor, collaborator, Māori advisor, Kaumātua/Kuia, etc.).
 - their FTE component per year for the life of the project.

b) What intentions do these researchers have regarding participation in capacity development initiatives? (maximum of 300 words)

Describe the proposed capacity development initiatives directed towards building the human and relational capacity of the SFTI researcher cohort. These can include facilitated discussions between researchers and industry stakeholders, engagement with iwi, leadership training and other joint activities with industry end users.

SUBSECTION 4.3: SUBCONTRACTING

**Detail intended subcontractors
(maximum of 300 words)**

Include in your proposal:

- The subcontracted Organisation
- The subcontracting status
- Year 1 \$000 ex gst
- Year 2 \$000 ex gst

SECTION 5: BUDGET

**a) Budget
(template provided)**

Please budget for the project providing details on the total funding applied for in the template provided in the portal, including the following budget lines detailed by year:

- Personnel Costs (include salary and overheads for each member of the team including their names, roles and FTE; and a total salary-related cost for superannuation, ACC, etc.)
- PhD students will be funded at \$27,500 p.a. tax-free scholarship plus \$7,500 p.a. contribution to tuition fees for 2 years. PhD funding may continue beyond 3 years but will be funded over 2 years. The contracted research needs to be completed within 2 years.
- Masters students will be funded at \$20,000 p.a. tax-free scholarship plus \$7,500 p.a. contribution to tuition fees for a maximum of 2 years
- Direct Costs / Operational Costs
 - travel & accommodation
 - consumables
 - other miscellaneous costs
- Equipment depreciation / rental (the Challenge does not fund the purchase of equipment directly, but may allow for a contribution to depreciation or rental costs for access to critical equipment)
- Extraordinary expenditure (any special equipment or resources required)

Provide a justification of major non-personnel budget items, including travel and, if sub-contracting, the total value of each sub-contract in the text box provided (300 words maximum).

SECTION 6: OBLIGATIONS AND CONFLICTS OF INTEREST

SUBSECTION 6.1: CONFLICTS OF INTEREST

**Conflicts of Interest
(200 words maximum)**

Identify any conflicts of interest you are aware of at this stage and why. Include Challenge members and assessment panel members.

Conflicts may occur at various levels:

- direct conflicts – when an assessor is directly involved with a proposal or has a close personal relationship with you;
- indirect conflicts – when an assessor is employed by an organisation involved in your proposal but is not part of your research programme, or when an assessor has a personal or professional relationship with you;
- if an assessor has an involvement (direct or indirect) with a proposal in direct competition with your proposal or where the outcomes proposed by your proposal may compete with the assessor's business interests.

SUBSECTION 6.2: ETHICAL OR REGULATORY OBLIGATIONS

**Ethical or Regulatory Obligations
(200 words maximum)**

It is your responsibility to ensure that all ethical or regulatory obligations are met (for example, from ERMA, MPI, Animal Ethics, Human Ethics). Detail any required approvals anticipated or gained necessary to conduct the intended research.

DECLARATION

You agree that by submitting this application to the SftI Challenge, you declare and acknowledge the following:

- I am authorised to submit the application on behalf of the applicant;
- The applicant is a legal entity capable of entering into a contract with the SftI Challenge;
- The information in the application is true and correct;
- All parties mentioned in the proposal who are not employed by the applicant have confirmed that the nature and level of their involvement in the work described in the proposal is correct
- Information received and generated by the SftI Challenge in relation to this application may be released in accordance with the Challenge's external reporting requirements or if required by law, including in accordance with the requirements of the Official Information Act 1982 or the Privacy Act 1993.

APPENDIX 2: Background and Objectives of the Challenge

Science for Technological Innovation, Kia Kotahi Mai: Te Ao Pūtaiao me Te Ao Hangarau (SfTI-TAPTAN) will enhance the capacity of New Zealand to use physical sciences and engineering research for economic growth through export-driven innovation in areas of strength and competitive advantage.

We will know we have succeeded when:

- our technologies are being used profitably by companies;
- when there is a free flow of expertise between industry and the research community, with joint industry/academic appointments the norm rather than the exception;
- opportunities for Vision Mātauranga are being realised enhancing technologies used by Māori enterprise, and growing the Māori economy
- when we succeed more often in translating research into new and better products and processes; when more start-ups are created, and when
- small manufacturing firms more often grow into medium-sized and large companies on the back of high-value exports.

Our vision for New Zealand is a vibrant and prosperous technology-driven economy, with new businesses offering high-value services and products that may not yet have been invented.

Four of our portfolios represent the industry sectors to which our research will be applied. Portfolio 1 - Building New Zealand's Innovation Capacity - encompasses developing New Zealand's innovation capacity - advancing capacity development to increase innovation and export performance. The Spearhead projects are the specific science projects in each portfolio – they are termed Spearheads because they open a new area of research. Successful Seed Projects could become the basis for new Spearheads in years to come.

A fuller description of the Challenge is given in the [Challenge Background](#) document.

The following sections give a brief overview of the themes and the rationale for capacity development.

Challenge Themes

Within the Challenge there are the following four themes, and seed project proposals must be aligned to one or more these.

IT, Data Analytics and Modelling (ITDAM)

This theme comprises a wide range of innovative models, methods, tools and practices that will be developed and embedded in the deployment of new or enhanced business processes, hardware components, and systems and software applications, enabling industry to customise and leverage these technology innovations into economically valuable products and services.

Materials, Manufacturing and Design

This theme encompasses research involving most aspects of advanced materials, high-tech manufacturing and industrial design. NZ has a small but vibrant high-tech processing and manufacturing sector. This theme will grow this sector by enhancing its reputation as a leader in green and smart manufacturing processes and novel materials leading to new or enhanced products, services and processes that leverage NZ's brand and gain a premium in export markets. Such processes, services and products will have high value relative to shipping cost, exhibit high levels of sustainability and traceability, target both existing and new niche global markets, and/or allow mass customisation or relatively frequent product changes, all of which reflect high embedded knowledge. Participation in global networks and close understanding of consumer and customer trends and perceptions at all stages of product and process innovation and development will ensure market success.

Sensors, Robotics, and Automation

This theme broadly encompasses research in a) a wide range of new or enhanced sensors and sensing technologies that will be developed and implemented in a variety of new or enhanced products or applications, and b) robotics and automation that will be 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. Projects in this theme will enhance NZ's capacity to use sensing, robotics, and automation for future economic growth, and will be driven by long term visions of the science that is required for transforming the way NZ uses technology in these areas.

Vision Mātauranga (VM)

At least 20% of total funding will be committed to projects that support Vision Mātauranga objectives. All projects aligning with VM must also align with one or more of the above science/technical themes.

Vision Mātauranga guides researchers on how to embed purposeful and mutually beneficial relationships with Māori. It supports the integration of western science and Mātauranga Māori (knowledge) to explore new and exciting opportunities to build a vibrant and prosperous technology-driven economy. The outcomes we are looking for are:

- a world-class exemplar of two-way exchange of knowledge systems between te Ao Māori (Māori world) and western science and innovation;
- realising the potential of the Māori value chain (its businesses and assets) to grow the New Zealand economy;
- an increased number of Māori scientists and engineers working in the hi-tech sector.

Vision Mātauranga Objectives seek to explore innovative and distinctive opportunities for Mātauranga Māori, for Māori resources and for relationships with Māori that are beneficial to both Māori and New Zealand as a whole. Applicable research is research that engages Māori, Māori practices and/or Māori knowledge in a meaningful way. Research approaches are content specific and may range from full Kaupapa Māori driven research to research likely to improve Māori outcomes and/or raise Māori capacity in hi-tech sectors. Vision Mātauranga seeks to increase returns for the Māori economy and subsequently for all of NZ.

Building New Zealand's Innovation Capacity (Portfolio 1)

In addition to these themes, Building New Zealand's Innovation Capacity is an over-arching social science portfolio within the Challenge. The portfolio's vision is to establish a high-performing seamless New Zealand commercialisation environment that has enhanced co-innovation capacities within and between physical sciences and engineering teams and a wide range of industry sectors. This includes:

- Human capacity - the ability of researchers to contextualise their research in terms that industry and other end-users (including Maori) can understand, and to place their research in the context of New Zealand and its economic growth;
- Relational capacity - the ways teams of researchers work, network and engage with user (including Maori) organisations.

The research is based on the concept of 'open innovation' which argues that to create value, enterprises need to acquire, assimilate and exploit knowledge from not only their own internal resources but also external sources. And because 'not all the smart people work for one particular company', this requires enterprises to connect with others. How enterprises or research teams connect is dependent on their capacity to connect.

Multiple research approaches will be used including surveys, case studies and observations of the process of research and industry engagement in our spearhead and seed projects. We seek to understand what works best in the New Zealand context, evaluate the effectiveness of our work and learn from it as we go. Since the Māori economy has distinctive features, we are interested in cases of co-innovation between Challenge researchers and Māori organisations.

All proposals aligning with Portfolio 1 should also have a primary alignment with one or more of the above science/technical themes.

Capacity Development

In the SfTI Challenge, capacity (or capability) development has 3 dimensions – technical, human and relational. SfTI aims to improve the technical capacity of researchers (in the form of new technical knowledge, platforms, and tools) through the research they perform. SfTI researchers will also be expected to improve their ability to connect with end users of research so that technical achievements can be more readily translated into business and economic outcomes. This is the development of their human and relational capacity. Some capacity development initiatives will be funded separately and all SfTI researchers are expected to participate.

More information of the Challenge’s capacity development programme can be found on the Challenge website at the link below:

<http://www.sftichallenge.govt.nz/capacity-development>

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