National SCIENCE Challenges


# Call for Expressions of Capability: Veracity Technology Research

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Illustration designed by Tyler Dixon, Waikato-Maniapoto, Ngāti Porou, Ngāi Tūhoe, Ngāi Tahu depicts a Mangopare (Hammerhead shark). It symbolises the strength in duality to be found in uniting Māori knowledge with western science.

Science for Technological Innovation (SfTI) is calling for Expressions of Capability (EoCs) from researchers to support the implementation of a new Spearhead project arising from SfTI's Mission Lab: Veracity Technology.

## ABOUT SPEARHEAD PROJECTS

Science for Technological Innovation (SfTI) Spearhead projects are intended to deliver specific innovative technologies to help achieve SfTI's overarching purpose of enhancing New Zealand's capacity to use physical sciences and engineering for economic growth. They should be mission-led and bring nationwide teams together to have a broad impact on this country's technology ecosystem, including capacity development for all team members.

## ELIGIBILITY

The purpose of the EoC is to assemble researchers so that SfTI can form a 'best' national research team, and we welcome EoCs from researchers at New Zealand based organisations. The EoC provides a summary of the process and what to expect.

## VERACITY TECHNOLOGY BACKGROUND

The Veracity Technology Mission is one of several new topics being explored by SfTI for Phase Two (2019-2024) of this National Science Challenge.

In essence, SfTI's Veracity focus is on developing technology that enables New Zealand to prove we are delivering on our claims. How exactly can we prove the truthfulness of the data, the people, and the place?

Early conversations have identified three themes as being relevant to delivering the Veracity Technology Mission:

1. Having an appreciation of the fundamentals of trust and veracity;
2. Understanding the context and need for veracity technology solutions in the real world; and
3. Ensuring solutions are fit for purpose and future focussed.

**Please note**: SfTI is not seeking investigator-led research ideas and proposals. Instead, we are interested in the expertise and experience you will bring to the research team in addressing the Veracity Technology Mission, for example, through your theoretical and methodological background, and/or experience in multi-disciplinary/ collaborative teams.

## THE SPEARHEAD DEVELOPMENT PROCESS

This project is at Stage 3 of the SfTI Spearhead project development process, see Appendix 1. The purpose of Stage 3 is to assemble researchers to form a 'best' research team. **You can read more detail about the Spearhead development process on our website.**

We want to develop a plan for a bold new research programme, including what might be achieved (with indicative milestones) and more detail for the first two years of the project. The plan may have 3-4 work streams but there must be an over-arching (longer-term) logic and internal connectivity to what is going to be attempted. A key element of the process will be the formation of a 'best NZ team', and looking for opportunities to collaborate with other organisations working in aligned areas.

Ultimately, this technology mission will meet all or most of the following criteria:

- Involves new, emerging and potentially world-leading science and/or technologies.
- Takes advantage of an opportunity or set of conditions that is unique to NZ.
- Makes good scientific sense to carry out original research in NZ.
- Is relevant to Vision Mātauranga, i.e. to unlock the innovation potential of Māori knowledge, resources and people.
- Can be applied in a unique way in NZ to generate economic growth for NZ.
- Builds capability in technology areas where NZ cannot afford to be deficient.

## Researcher Workshops

From the Expressions of Capability, a group of researchers, together with Māori and industry representatives, will be invited to participate in a process to establish the team that will develop a Veracity Technology research proposal to be considered by the SfTI Board.

The process will conclude when a formal research programme proposal is completed.

## The Concept-Knowledge (C-K) Approach

SfTI is experimenting with a new process which employs the Concept-Knowledge (C-K) Methodology. To participate in this process, selected researchers are expected to attend a series of online workshops between September and November 2020 (Māori and industry representatives will be involved in the first and last few sessions). We are looking for a core, multidisciplinary group who can commit to taking part in the full process to achieve group consensus on next steps.

The C-K approach is a set of design methods used to produce highly innovative ideas and products. The process aims to provide participants with tools that will help them map possible innovation pathways for further exploration.

We expect the C-K approach will help the Veracity participants generate ideas in a time-controlled and methodical manner. The aim is to build new interdisciplinary teams who will, in collaboration with iwi and industry partners, present a coherent project proposal.

Because C-K is new to the New Zealand Science system, members from SfTI's Building New Zealand's Innovation Capacity (BNZIC) team will be exploring how well the process works for our context. Full details about this will be given to all participants.

# HOW TO APPLY

Register your capability by sending your completed application form and CV to:
**SfTIChallenge@callaghaninnovation.govt.nz.**

**Applications close Monday 17 August 2020.**

The application form asks for a brief summary of your experience and how it might relate to the current mission. The form is at the end of this document, or it can be downloaded from our website:
**https://www.sftichallenge.govt.nz/news/veracity-technology-mission-calling-for-expressions-of-capability**

Please note: Long applications will not be considered so do not exceed the word limit.

## Key dates and process

- Veracity Technology EoC released – Monday 20 July 2020
- EoC Applications close – Monday 17 August 2020
- EoC submission outcome confirmed, and Workshop invitations sent via email to researchers – Friday 28 August 2020
- Cycle 1 C-K Workshops* begin – mid-September 2020
- Cycle 2 C-K Workshops* begin – early-October 2020
- Cycle 3 C-K Workshops* begin – early-November 2020
- Veracity Technology Spearhead research proposal approved and project commences – from early-mid March 2021

* *The CK process will have three cycles, with an average of two 90-minute and one 60-minute workshops per cycle.*

Funding for the Veracity spearhead research project will be a maximum of $1m per annum, for up to three years.

## Contact information

If you have any questions about the EoC process, email Rafaela Rabello, Research Fellow, University of Otago:
**rafaela.costacamoesrabello@otago.ac.nz**

For all other questions relating to Veracity Technology, expertise and capability, email SfTI Leadership Team members:

- Bruce MacDonald: **b.macdonald@auckland.ac.nz**
- Stephen MacDonell: **stephen.macdonell@aut.ac.nz**

# BACKGROUND TO THE EoC

Discussions about the Veracity Technology Mission have revealed enthusiasm for this area of exploration, with potential benefits identified. In particular, there is recognition that such technology could: support New Zealand's exporters to achieve 'cut through' in crowded markets and attract premium prices for goods and services; minimise opportunities for counterfeiting; help consumers navigate the buying process safely; help solve big global problems such as climate change; and maximise opportunities inherent in social movements such as online crowdsourcing.

Specific factors identified as important in developing a programme of research around Veracity Technology include:

1. Having an appreciation of the fundamentals of trust and veracity.
2. Understanding the context and need for veracity technology solutions.

3. Ensuring solutions are fit for purpose and future focussed.

As with all SfTI research, in order to be funded, each new mission is required to demonstrate how it would leverage New Zealand's unique strengths, capabilities and/or resources to take a measurable, future-oriented leadership position. Incorporating Māori knowledge and cultural practices related to Veracity is an obvious way to do this, and it is a cornerstone of the approach that SfTI wishes to take.

Additionally, our research should identify where there is key 'stretch', and this extends beyond our borders to consider globally stretchy science, as well as 'NZ-sticky' research potential. Ultimately, this programme of work must create new knowledge leading to technological innovation resulting in longterm economic benefit to New Zealand.

### Refining the research programme

To date, we have begun speaking with industry and Māori representatives to explore where there may be feasible technologically-based (non-policy) solutions. As we move this project forward, more in-depth engagement will take place to ensure the research meets identified needs and takes a partnership approach**. At this stage we are seeking to devise and prioritise research programme elements that would align to the recommendations and priorities established through our consultation to date.**

## IMPORTANT RESEARCH CONSIDERATIONS

Our vision for this mission is to develop science and technology that sits behind proving we are delivering on our claims. This may include establishing and maintaining trust, or sharing unequivocal data. Equally it may focus on mitigating distrust, or removing source impurities and collusion opportunities. Ultimately, how might the resulting technology give people confidence in our products, systems and country?

**Vision Mātauranga (VM)**

New Zealand is uniquely positioned to combine both Māori philosophies and Mātauranga with western science when developing Veracity Technology. In this way, we can capitalise on one of this country's unique assets.

In particular, when working with Māori communities, it is important that researchers establish long-term relationships and grow shared understandings in order to support two-way knowledge and technology transfer between western science and Mātauranga Māori.

With regard to Veracity Technology, researchers should be mindful to:

- include Māori researchers in the project
- ensure the researchers are skilled in working with Māori
- involve Māori communities and businesses in problem/solution definition
- protect Mātauranga Māori Intellectual Property
- ensure the science and technology filters through to Māori communities and business.

**Duplication**

It is acknowledged that there is a great deal of work already taking place in this area, particularly with the application of blockchain technology to supply chains, as well as biological testing of food, for example. Additionally, questions remain as to how much integration of existing technology is required, and what novel science is yet to be uncovered.

As part of the C-K process to develop this research programme, participants will identify 'the state of play' through reference to: academic literature; industry research and information; international peers; and patent databases. We are looking to identify research questions that have not yet been explored by others in any depth.

With reference to three very broad themes already identified, we aim to develop an integrated, cohesive set of research questions and a programme of work that fits within the overall context of Veracity Technology. Each of these themes is discussed below, followed by a list of potential research ideas [these are not exhaustive].

### 1. Having an appreciation of the fundamentals of trust and veracity

It is difficult to conceptualise what kind of technology solutions the Veracity Technology Mission might produce, not least because the concept of Veracity appears somewhat amorphous. However, there are real world elements of trust and veracity that will impact on any successful technology that could sit behind proving we are delivering on our claims.

For example, perceptions of the organisation generating claims and the message delivery channel used each have huge impacts on whether people will accept the data and stories presented to them. Ostensibly, technology cannot replace the need for real world trust, and is more likely to be useful in magnifying existing trustworthiness.

Early discussions have elicited agreement that Mātauranga Māori and Māori culture could offer new ways of approaching Veracity that no one else has thought of or used in relation to science and technology. For example, tā moko is recognised by some as a community-verified mark of identity, whakapapa as a process for sharing relationships, and pepeha as a way of establishing trust through reciting an individual's relationships to people and places.

What do these cultural practices mean for Veracity?

"An indigenous approach attracts trust because it is less 'in it for the money'; it's more about people, longevity and the land."

## 2. Understanding the context and need for veracity technology solutions

It is important that researchers consider the needs of potential user groups, including consumers, communities and businesses. Each has their own set of needs, and technology solutions should aim to meet these. Additionally, issues such as climate change and the current pandemic may be highly relevant. There are many questions to consider.

What are **consumers** trying to achieve and what do they want to know?

- What does trust mean from a buyer's point of view?
- What are consumers interested in knowing? For example, food/medicine safety, worker safety, climate impact, assurance against cultural appropriation, circular economy, animal welfare etc.

"How much do consumers actually want to know, for example, they might not want to see the specific animal's face."

What are **communities** trying to achieve?

- What does Veracity look like for Māori?
- How do we design and build an inclusive Veracity project with Māori that returns benefits to Māori?
- How might Veracity Technology enable people and communities to participate in New Zealand's infrastructure (e.g. energy or insurance), be identified as 'good actors', and reap benefits at a local/community level?

What do **businesses/exporters** want to achieve that they can't currently?

- Brand (arguably the life blood of businesses) is essentially the basis for Marketing Trust, and reputation is a key part of this. There is an equation used to understand brand: Expectation v Experience. How can Veracity Technology support strong, trusted brands?
- How do sellers ensure buyers have an easy and enjoyable buying experience, and how can they achieve 'cut through' to connect with customers in the first place?

"In our world there is so much messaging and noise – how do we cut through to say ours is the real one, especially in social media?"

- Do New Zealand exporters want to circumvent the need to travel to foreign markets to build trustful relationships with buyers?
- Given New Zealand's reliance on food exports and the significant Māori investment in primary production, what is important when it comes to achieving premium prices for our meat, dairy, fruit and forestry?
- What are the likely future expectations of our key markets in terms of product/service veracity?
- What information will support smart investment decisions?
- As buyers of professional services, how might a Veracity tool help New Zealand businesses verify overseas vendors?

What larger **contextual factors** might guide the Veracity Technology Mission's research focus? Several opportunities have been identified, particularly in terms of COVID-19.

- People are becoming more concerned with food safety, as well as the safety/treatment of workers during lockdown. How can consumers feel sure they are supporting 'good' businesses?
- New Zealand is currently enjoying the halo effect of our successful response to the pandemic and the Prime Minister's management. This mixes with an existing positive 'clean green' image. How might this real-world trust be capitalised on?
- There is an opportunity to build public awareness and perceptions around the connectivity of everything, including food, medicine, contact tracing, health and safety.

"Since COVID-19 the whole world has moved online."

- Veracity Technology that draws from Māori knowledge and feeds into positive outcomes for Māori may have a market with other indigenous peoples around the world.

**Note:** Those spoken to thus far thought that social/market research and/or design thinking would be foundational for ensuring that Veracity Technology research draws from fundamental knowledge of trust and veracity and speaks to both need and context.

## 3. Ensuring solutions are fit for purpose and future focussed

Veracity Technology will need to 'bake in' innovation and compatibility to fit with existing infrastructure, as well as future-proof for both new technology and 'bad actors' wishing to disrupt solutions.

Technology that is scalable and affordable would fit well with New Zealand's preponderance of small and medium business and increase the likelihood that a critical mass of

people would use any tool developed. Further, a sustainable solution is favoured, and this may preclude the integration of energy-hungry blockchain.

With regards to primary food exports, it is noted that global supply chains are extremely complex, extending from on-farm activities (as well as farm suppliers) through to distributors, value-add processors, food service outlets, and home kitchens. Despite the resulting difficulties created, this situation presents opportunities too as there are many small problems along the chain to be solved. Working with those in the industry to understand the movements of primary produce and inherent pain points will be critical if this mission focuses on food exports.

## Potential areas of research focus

A number of potential research directions have been collected, and as noted above, any proposed area of application would need to be well-understood before the right technology could be developed.

- Food systems, including functional food, traceability, and provenance.
    - Country-of-Origin labelling is already well received by customers. What additional, provable information can we provide to customers about provenance, carbon-neutral status, animal welfare etc?
- Fibre systems
- Collecting, collating and communicating complex data about New Zealand's goods and services in ways that are simple and easily accessible to consumers.

"Data gets so complex so quickly that people get overwhelmed. Keep it small and simple and build on that."

- A big, complex global challenge that is meaningful to all people. This would inevitably require multi-disciplinary research.
    - For example, sustainability. Could we build a Veracity Chain that allows all parts of the economy and society to contribute to solutions to our biggest environmental challenges?
- Decentralisation of power. Peer to peer systems, including crowdsourcing ideas and expertise, money lending (in small amounts), insurance, energy (sharing energy, allowing communities to take ownership).
- Marrying science and regulatory solutions is considered possible in New Zealand, and has already been achieved, for example, when Rocketlab influenced legislative change to ease rocket launch restrictions. This potentially is a specific competitive advantage for a small country.

"Role modelling distributed systems and what this means with regard to the law. New Zealand is a small nimble country so we could test a legal ecosystem that accounts for and recognises distributed systems."

## APPENDIX 1 – SPEARHEAD DEVELOPMENT PROCESS