**SCIENCE FOR
TECHNOLOGICAL
INNOVATION**

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*Kia kotahi mai –
Te Ao Pūtaiao me
Te Ao Hangarau*

INTERIM CAPACITY DEVELOPMENT REPORT

Accelerating Science Innovation

THROUGH HUMAN AND RELATIONAL SKILLS DEVELOPMENT

JUNE 2022

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.

He Hiringa Hangarau, He Oranga Tangata

Innovation in technology for the benefit of people.

TĀ (SIR) POU TEMARA

Give a man a fish and you feed him for a day.

Teach a man to fish and you feed him for a lifetime.

SfTI's mission is to 'enhance capacity', particularly in terms of: Human Capacity, related to influencing, managing, collaborating, and communicating with others; and Relational Capacity, which underpins the ability to make and maintain networks with industry, Māori, and scientists across multiple disciplines. Bringing these skills together with new Technical Capacity is seen as the ideal way to achieve the outcomes suggested by MBIE's own definition of research impact, now and into the future:

"A change to the economy, society or environment, beyond contribution to knowledge and skills in research organisations."

(THE IMPACT OF RESEARCH, POSITION PAPER, MBIE, OCTOBER 2019)

Contents

Overview

The Science for Technological Innovation National Science Challenge (SfTI) was given its mission by the New Zealand Government to "enhance the capacity of New Zealand to use physical sciences and engineering for economic growth". This makes SfTI unique in the National Science Challenges in that its mission is explicitly behavioural as well as technical in orientation.

SfTI is enhancing capacity in many ways, including prototyping new processes for forming and managing research projects. As part of this suite of activities, SfTI established a Capacity Development programme available and promoted to any researcher supported by SfTI.

SfTI's Capacity Development programme is supported by funding dedicated to developing the human and relational skills of scientists, which represents a major extension to traditional funding approaches. It recognises that far more than just technical skills are needed to be a successful researcher who produces impactful work.

The Capacity Development programme targets these two skill areas: relational and human capacity:

- **Relational capacity** is about the ability to network with the wide range of stakeholders necessary to developing a technology that is relevant and impactful to society at large, and for bringing it to market. Specifically, this involves relationships with industry, Māori and researchers from other disciplines.

- **Human capacity** encompasses the skills that enable scientists to influence, manage, collaborate, and communicate with others. Traditionally this hasn't been seen as a necessary part of a scientists' training, but it is essential for scientists working together in teams, and for connecting science with societal impact.

The various Capacity Development programme activities were categorised into three types according to the processes they supported. These processes were:

1. **Priority-sourcing:** Ensuring that research questions, approaches and investment align with industry and Māori aspirations;

2. **Collaborating**: Empowering multi and interdisciplinary teams to collaborate; and

3. **Implementing:** Getting ideas out of the lab and into the market where their social and economic benefits can be realised.

Supportive feedback and anecdotal evidence of significant behavioural change have been gathered. This is an interim report which has canvassed the attendance patterns and reflections of those involved in the Capacity Development programme, as at the end of 2021. A final report will be produced in the 2023-2024 year.

In addition to the All of Researchers' workshop, the three most highly valued offerings were:

- exposure to a variety of Vision Mātauranga-related events (priority-sourcing)

- leadership training and coaching (collaborating) and

- the Rewa Ake commercialisation programme (implementing).

Across all the SfTI capacity development activities to date, this report outlines four observed broad impacts for the SfTI research community:

- enhanced personal confidence

- improved ability and willingness to seek out others' perspectives and to integrate subsequent new understanding into the research

- increased networks inside and outside the research community, and

- guided practice of new behaviours appears to cement behaviour change.

SfTI views its Capacity Development programme as possibly the most comprehensive available to New Zealand researchers, and substantially augmenting what is available in the rest of the research system.

Sally Davenport
Director

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Introduction

This interim report describes SfTI's Capacity Development Programme and explores early results about how it appears to be changing researcher behaviour. Capacity Development is one of several experiments SfTI has carried out around the processes of research funding to see if and how innovation can be accelerated and made more equitable.

The purpose of the interim report is to clearly communicate what the programme set out to do, how it was implemented and what it has delivered over the six years since its inception, in order to provide a roadmap for other organisations wishing to do the same. In a subsequent final report, we will explore in more detail if and how the initiative has changed researcher behaviour and created positive impact within the science sector and beyond in Aotearoa New Zealand.

SCIENCE FOR TECHNOLOGICAL INNOVATION NATIONAL SCIENCE CHALLENGE KIA KOTAHI MAI - TE AO PŪTAIAO ME TE AO HANGARAU

SFTI IS A 10-YEAR PROGRAMME OF GOVERNMENT-FUNDED RESEARCH WITH THE FOLLOWING MISSION:

To enhance the capacity of New Zealand to use physical sciences and engineering for economic growth.

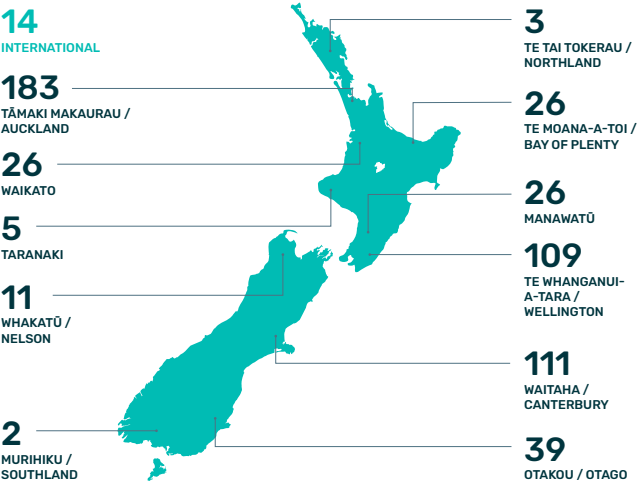|	
To enhance	Increase, intensify, improve, accelerate
the capacity	knowledge, ability, skill, talent, capability, power
of New Zealand	researchers, scientists, Māori, businesses, communities and government
to use	harness, design, develop, progress, implement, produce
the physical sciences and engineering	physics, chemistry, mathematics, materials, manufacturing, data, analytics, robotics, sensing, technology, Mātauranga Māori
for economic growth	for prosperity, wellness, wealth, oranga tangata

Achieving this mission constitutes a step toward our future vision of a New Zealand with a vibrant, prosperous, technology-driven economy in which researchers can fully integrate with, and contribute to, government policies and industry strategy, and where business delivers novel high-value products and services that meet market demand.

To date, SfTI has invested in over 550 researchers across 11 large spearhead projects and 84 small seed projects. Each project aligns with one or more of four research themes, and researchers span 46 organisations, nine of which are based overseas.
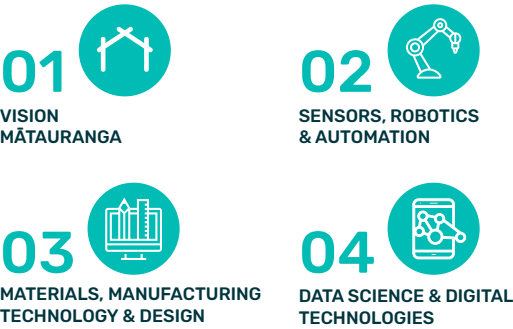
SCIENCE FOR TECHNOLOGICAL INNOVATION
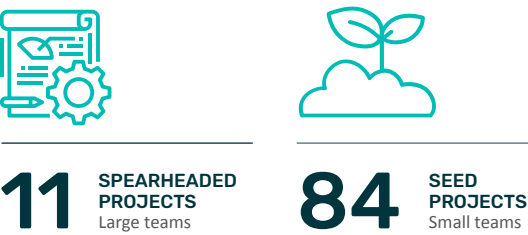
At a Glance

OUR PEOPLE

555 RESEARCHERS

72 MĀORI | **140** WOMEN

130 EMERGING RESEARCHERS

46 ORGANISATIONS
Including 9 international

14 INTERNATIONAL

183 TĀMAKI MAKAURAU / AUCKLAND

26 WAIKATO

5 TARANAKI

11 WHAKATŪ / NELSON

2 MURIHIKU / SOUTHLAND

3 TE TAI TOKERAU / NORTHLAND

26 TE MOANA-A-TOI / BAY OF PLENTY

26 MANAWATŪ

109 TE WHANGANUI-A-TARA / WELLINGTON

111 WAITAHA / CANTERBURY

39 OTAKOU / OTAGO

OUR PROJECTS

4 THEMES

01 VISION MĀTAURANGA

02 SENSORS, ROBOTICS & AUTOMATION

03 MATERIALS, MANUFACTURING TECHNOLOGY & DESIGN

04 DATA SCIENCE & DIGITAL TECHNOLOGIES

STRETCH SCIENCE

11 SPEARHEADED PROJECTS
Large teams

84 SEED PROJECTS
Small teams

OUR DEVELOPMENT

COMMERCIALISATION
INNOVATION
MEDIA TRAINING
ENTREPRENEURSHIP
MĀORI ECONOMY
BUSINESS AWARDS
TECHNOLOGY
LEADERSHIP
SPEAKING WITH PURPOSE

PITCHING SKILLS
MISSION LED SCIENCE
COMPANY VISITS
STAKEHOLDER ENGAGEMENT

OUR ATTENDANCE RECORD

359 ALL OF SFTI WORKSHOPS

1,277 AT 133 COURSES AND WORKSHOPS

168 AT 39 CONFERENCES

VISION MĀTAURANGA

720 AT 60 MĀORI FEATURE AND ECONOMY EVENTS

$33m PHASE 1 (2014 - 2019) **+** **$73m** PHASE 2 (2019 - 2024) **=** **$106m**

RESEARCH THEMES | ARIĀ RANGAHAU

SfTI collaborates widely with industry and Māori to create relevant science and technology, and its research themes are designed to be multidisciplinary topics that support real world application across business sectors and communities:

Vision Mātauranga

Vision Mātauranga guides researchers on how to integrate western science with mātauranga Māori (knowledge) to explore new opportunities to build a prosperous, technology-driven economy.

Materials, manufacturing technology and design
Ngā matū, te whakanao me te hoahoa

New Zealand has a small, vibrant hi-tech processing and manufacturing sector. This theme aims to advance the sector's reputation as a leader in smart, green manufacturing processes and materials.

Sensors, robotics and automation
Ngā Pūoko, karetao me te aunoatanga

This theme aims to develop robotics and automation for use in a range of products and applications. The focus is on cost reduction, improved efficiencies, and safety across multiple sectors.

Data science and digital technologies
Hangarau Mōhiohio, te tātari raraunga me te whakatauira

This theme aims to develop innovative algorithms, models, methods, tools and practices that could underpin new or enhanced business processes, hardware components, systems and software applications.

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About Capacity Development

When scientists use people-centred skills in concert with their technical capability, it serves to amplify their ability to create impact from scientific efforts.

THREE TYPES OF CAPACITY WILL HELP SFTI ACHIEVE ITS MISSION:

Technical capacity

the scientific and technical skills of physical scientists and engineers

Human capacity

Skills that enable scientists to influence, manage, collaborate, and communicate with others, and which help them contextualise their work within a global policy push for 'science for society'

Relational capacity

The ability to make and maintain networks with industry, Māori, and scientists across multiple disciplines

SfTI's Capacity Development Programme aims to stimulate system-level change that will elevate both human and relational capacities to a similar level of importance as technical capacity. This is in contrast to a status quo that tends to privilege technical capacities in New Zealand's research system.

SCIENCE FOR TECHNOLOGICAL INNOVATION

Capacity Development Programme

Our Capacity Development Programme supports researchers to build their human (soft skills) and relational (networking) capacity to engage sooner and more effectively with industry and Māori.
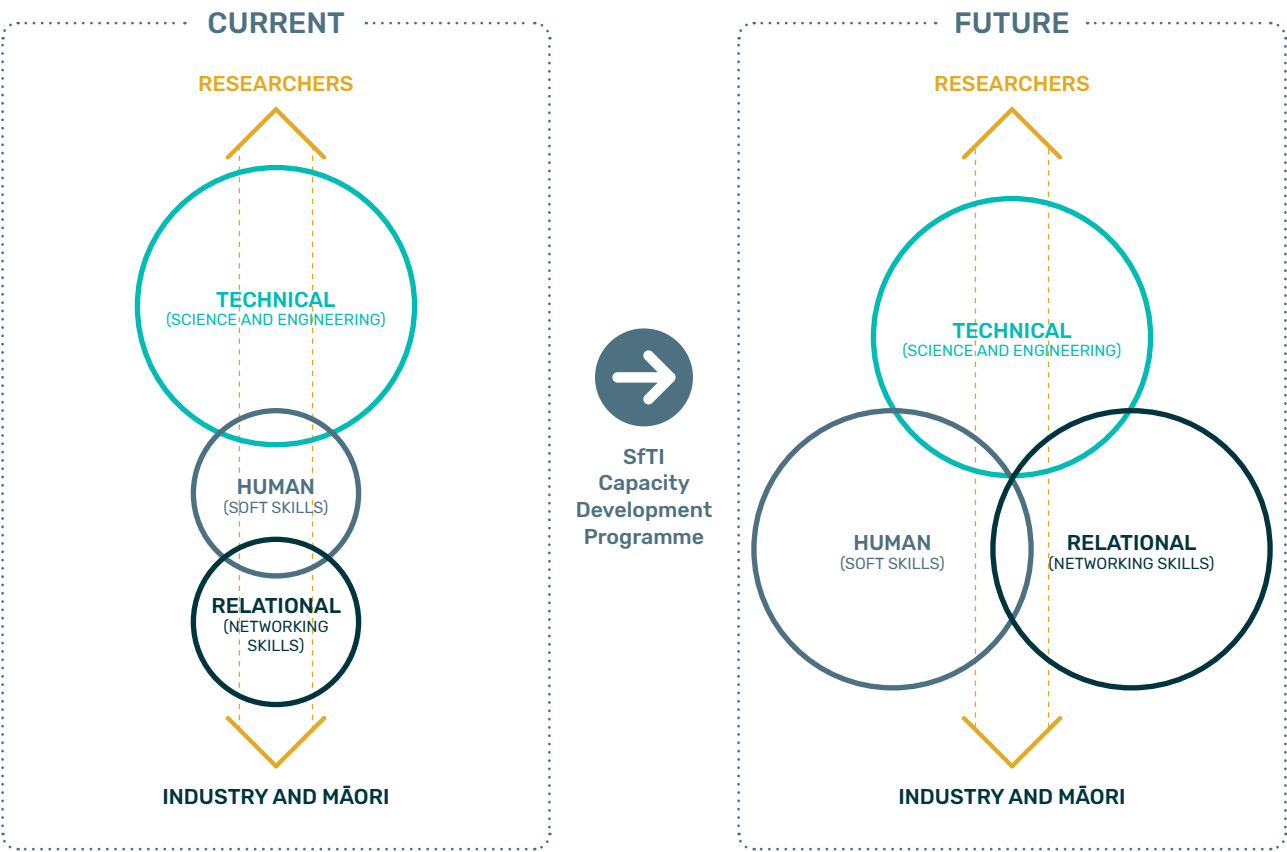
RATIONALE

Communication, collaboration, and networking skills are essential if the links between scientists and between science and society are to be strengthened. In the past, it was acceptable for individual scientists' work to focus on advancing fundamental knowledge in their areas of expertise, which often did not require engagement with other scientists nor beyond their discipline. Now, there is a growing imperative for research to produce societal benefit and impact. To achieve this, scientists need skills in communicating and collaborating with a wide range of people in order to understand their needs rather than developing new innovations in isolation and then attempting to sell them to the public.

The push for 'science for society' represents a global effort to reorient scientific endeavour towards the resolution of grand societal challenges such as climate change. Increasing scientists' human and relational capacity improves the functioning of multi- and inter-disciplinary teams, which are understood to be the most effective approach to solving large scale, complex challenges. Multi- and inter-disciplinarity refers to the utilisation of multiple, different disciplines and/or world views to solve a problem; capacity development is usually needed to help researchers facilitate this kind of research.

Human and relational capacity development is similarly useful for bringing new research and solutions into the marketplace. However, limited university-industry collaborations and a lack of diversity in the science and innovation system are both a symptom and a cause of the historical lack of attention paid to researchers' interpersonal skill development. SfTI takes the position that these significant system-level changes to the status quo will potentially create the kind of real world impacts we are looking for. At its heart, increasing science impact relies on moving scientific and technical innovations out of the lab and into the hands of industry, Māori and the rest of society through the process of co-design.

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PROGRAMME IMPLEMENTATION

From the outset, SfTI created a dedicated fund to develop and implement the Capacity Development Programme so researchers would not have to sacrifice research budget to pay for human and relational capacity development opportunities. This fund is sufficient to create and host a number of workshops annually and, for example, provide leadership and team coaching from qualified coaches, as well as support researchers to attend relevant events provided by third-party organisations. Travel and accommodation are also funded by SfTI to remove barriers to attendance.

The Challenge's research contracts require researchers to participate in at least one capacity development activity per year. Researchers are free to identify their own training needs, but they must relate to skill areas not considered part of their typical academic experience. For instance, attending conferences in their scientific discipline would not be funded as they fall into the category of technical capacity development.

TRACKING THE CAPACITY DEVELOPMENT PROGRAMME (TO MID-2021)

Understanding the impact of SfTI's new processes, including capacity development, was considered essential from very early on in the Challenge. A social science team has been funded to track the evolution of SfTI's science projects through observation, interviews, and surveys, with a particular focus on how researchers collaborate with each other and with external stakeholders including Māori and businesses. This has enabled the team, Building New Zealand's Innovation Capacity (BNZIC), to also build a growing understanding of the Capacity Development Programme's impact.

The BNZIC research represents the first significant investigation in New Zealand into how researchers, Māori, Māori businesses and industry interact, and how cultural capacity can be built into the innovation ecosystem. The team also aims to identify the barriers and enablers of accelerating innovation equitably, including an analysis of SfTI's own interventions. In documenting such evidence, BNZIC is creating international interest in SfTI's approach to research support. Insights about what works and what doesn't are continuously fed back to the SfTI leadership team who have the freedom to adjust SfTI processes in response.

THREE TARGET FOCI OF THE CAPACITY DEVELOPMENT PROGRAMME

While there are many ways that human and relational skills can enhance the impact of science and innovation, the SfTI Capacity Development programme can be seen as targeting the following three processes:

1. **Priority-sourcing:** Ensuring that research questions, approaches and investment align with industry and Māori aspirations;

2. **Collaborating:** Empowering multi and interdisciplinary teams to collaborate; and

3. **Implementing:** Getting ideas out of the lab and into the market where their social and economic benefits can be realised.

Three Capacity Development Targets

PRIORITY SOURCING

Ensuring that research questions, approaches and investment align with industry and Māori aspirations

COLLABORATING

Empowering multi- and inter-disciplinary collaboration

IMPLEMENTING

Bringing ideas out of the lab and into the market where their social and economic benefits can be realised
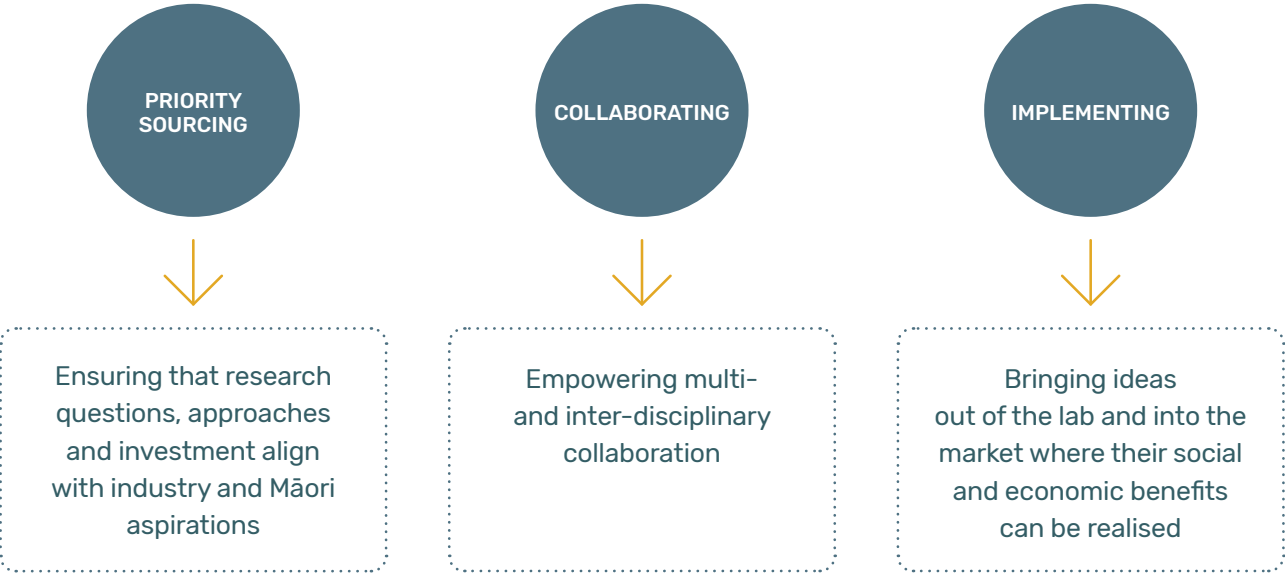
Examples of activities made available through the Capacity Development programme categorised by their process orientation, together with attendee feedback and early findings from BNZIC research is provided in Appendix A.

1. PRIORITY-SOURCING

Helping scientists to recognise stakeholders' priorities, and/or modify existing assumptions toward more pro-social outcomes

With some great exceptions, scientists in recent times have tended to explore new technologies in relative isolation from industry and Māori, driven by open questions amongst research communities, usually seeking input from outside communities only when a technology is almost fully developed. Exacerbated by the traditional research funding models which prioritise researcher-initiated ideas, and the false dichotomy of pure vs applied research, this has created 'science-push', or science that is developed without a clear sense of the market demand, social need, or consumer appetite. Ultimately, this can result in a misalignment between what scientists produce and what the world needs.

In contrast, SfTI has sought to re-balance this in our larger projects and create the conditions for more 'industry/community-pull' scenarios by increasing the capacity and opportunities of researchers to engage early with industry and Māori. This approach involves stakeholder groups as co-designers from conception and throughout the entire innovation process, ensuring technology development decisions are informed and shaped by business and Māori knowledge of community needs, interests, and opportunities.

Cultivating skills to enable scientists to connect and communicate with businesses, Māori and other communities across New Zealand helps scientists build a sense of where scientific solutions are most needed and what they should look like. While there are formalised approaches for understanding the business case for a scientific endeavour, relationships can serve as a litmus test for interest even before a business case needs to be made.

Better scientist-stakeholder connection reduces misalignment and increases the likelihood of useable, successful technology being created.

IMPACT EXAMPLE

After engaging with industry at a Get Funded! Workshop, a science leader was prompted to test the market viability of their product: *"I even spoke to end users about the product at that event and it was really interesting that the people that would buy this would want something that was less toxic, but really stable. They didn't really care if it was better or not."*

The researcher was surprised because they had assumed users *"would want something that was exceptionally better. But no, they were just happy to have a safer replacement."*

2. COLLABORATING

Helping scientists to collaborate effectively and be impactful influencers

Mission-led science is characteristically complex and requires researchers to rally together across different disciplines, stakeholder groups and even worldviews to generate novel solutions. Members of effective multi and interdisciplinary teams employ various influencing and leadership skills to help formulate plans, cooperate, and achieve milestones - sometimes remotely - over extended periods of time.

Being confident in building trust is important for creating an environment where individuals feel willing to communicate, share information, and give their best efforts. Under such conditions, and over time, technical progress is accelerated, and challenges can be overcome more easily by strong relationship building skills.

IMPACT EXAMPLE

SfTI's Leadership Programme was particularly effective in helping some science leaders elicit the best from their teams. As one attendee noted, they *"learned a lot of things on how to approach other people...maybe they have something more personal that's affecting productivity. So instead of just saying, "Why haven't you done that?" trying to ask, "What's wrong? Is there something going on at the moment?"*

Trying to be more of a person, than just a boss. It [the leadership programme], helped me realise I hadn't been really flexible around it."

This researcher's behaviour changed once they understood *"how to deal with people to achieve what we need to achieve, how to manage my team, how to work with them and work together to achieve the milestones and eventually get the project done."*

3. IMPLEMENTING

Helping scientists to disseminate innovation and create impact through implementation and commercialisation.

Learning about implementation or commercialisation helps scientists to understand when and how to interact with industry and other societal groups, and how to negotiate the needs of both researchers and the business and/or social sectors they are working with to align outcomes.

Progressing research and innovation through the steps necessary for implementation and commercialisation requires different people and skill sets at different stages. In some cases, scientists may wish to have a direct role in developing their innovation through to a product or service; other scientists may wish to hand on their innovation to a commercialisation expert at the appropriate stage. The key is for a scientist to know how to navigate the phases they see themselves involved with, and how to collaborate with others at the appropriate times.

IMPACT EXAMPLE

Several capacity development activities have changed how scientists communicate their science, especially to people not in the same field. As a result of attending the Pitching Workshop for example, one science leader *"learnt that giving details is not the most important thing from another person's perspective. That might be nice for another person who is in the same field, but if they come from [industry] for example, instead of telling them how I would do it, I would say what the advantages of it would be."*

Similarly, another science leader who participated in the Building Better Faster Collaboration Workshop changed how they communicated with stakeholders with regard to commercialisation: *"When you're emailing them wanting to go and talk to them about something, it's being quite mindful about them needing to see what the value proposition for them is ... always making sure [that you are] articulating things from the business perspective, rather than the research value of things."*

3

Capacity Development Activities

The Capacity Development Programme encompasses a broad offering of training that aims to progress researchers' confidence and ability across the three areas of Priority-sourcing, Influencing, and Implementing.

Between 2015 and 2021, the Capacity Development programme has supported 133 events ranging in size from the large All of Researchers' workshops open to the whole SfTI community, to targeted events for individual initiatives approved by the capacity development team. The All of Researchers' workshop is the most popular capacity development event, noting that this is not a technical workshop but is focused on human and relational capacity development opportunities.

While the intent was for everyone funded by SfTI to attend capacity development activities, once leadership team members are excluded (as they participate at a much higher rate), about 45% of the SfTI community has engaged. BNZIC interviews suggest that many of the post-graduate and post-doctoral researchers either did not realise they were eligible or were more concerned with completing their studies. When there is spare capacity, SfTI has occasionally opened the programmes to researchers from other National Science Challenges and Centres of Research Excellence, but while this move helps diffuse our thinking across the research community, these guests are not included in this analysis.

Taking a closer look at who has been attending these development activities on page 22, we can see some trends in the data. Of the total number of events, 40 were focused on Collaborating, 43 on Priority-Sourcing and 45 developed Implementing skills, while the All of Researchers' workshops usually cover all 3 areas. In addition, 32 of the 133 events were Vision Mātauranga-focused and also fall under one of the other three categories. Examples with feedback of various capacity development events in the 3 areas are provided in appendix A.

The timeline on page 22 shows how the Capacity Development programme was ramping up activity as the SfTI community grew, with a peak of 42 events in 2019. As the graph below indicates, the Covid-19 pandemic affected the Capacity Development programme greatly, with the ability to hold kanohi ki te kanohi (face to face) events severely curtailed. While some events, such as the Relational Leadership and Rewa Pre-Accelerator programmes, were successfully migrated to an on-line format, the very popular All of Researchers' workshop, with its built-in capacity development activities, has not been held for the past two years. Analysis suggests that attendance at any All of Researchers' workshop was linked to greater uptake of other capacity development activities.

Capacity Development Attendance by the Three Process types

SFTI YEAR	TOTAL CAPACITY DEVELOPMENT EVENTS	AVERAGE ATTENDANCE OER EVENT (EXCL. AoR)	MAX ATTENDANCE (EXCL. AoR)	ANNUAL RESEARCHER WORKSHOP (AoR)	VM FOCUS	AVERAGE ATTENDANCE VM	PRIORITY-SOURCING	AVERAGE ATTENDANCE PRIORITY-SOURCING	COLLABORATING	AVERAGE ATTENDANCE COLLABORATING	IMPLEMENTING	AVERAGE ATTENDANCE IMPLEMENTING
2015-16	5	5.5	9	46	1	1.0	1	1	1	9	2	16
2016-17	18	7.4	29	80	7	7.6	9	6	5	15	3	8
2017-18	21	8.5	34	105	2	8.5	5	6	5	11.8	9	8
2018-19	43	5.5	26	96	12	4.3	13	4.2	12	4.9	17	6.9
2019-20	19	5.1	11	*	4	3	5	4.2	8	5.9	6	4
2020-21	27	5	25	*	6	1.5	10	4.9	9	4.4	8	5.6
Overall	**133**	**6.7**		**81.8**	**32**	**5.4**	**43**	**4.3**	**40**	**10.2**	**45**	**9.7**

* Workshop was not held due to Covid-19 restrictions.

Events by Type

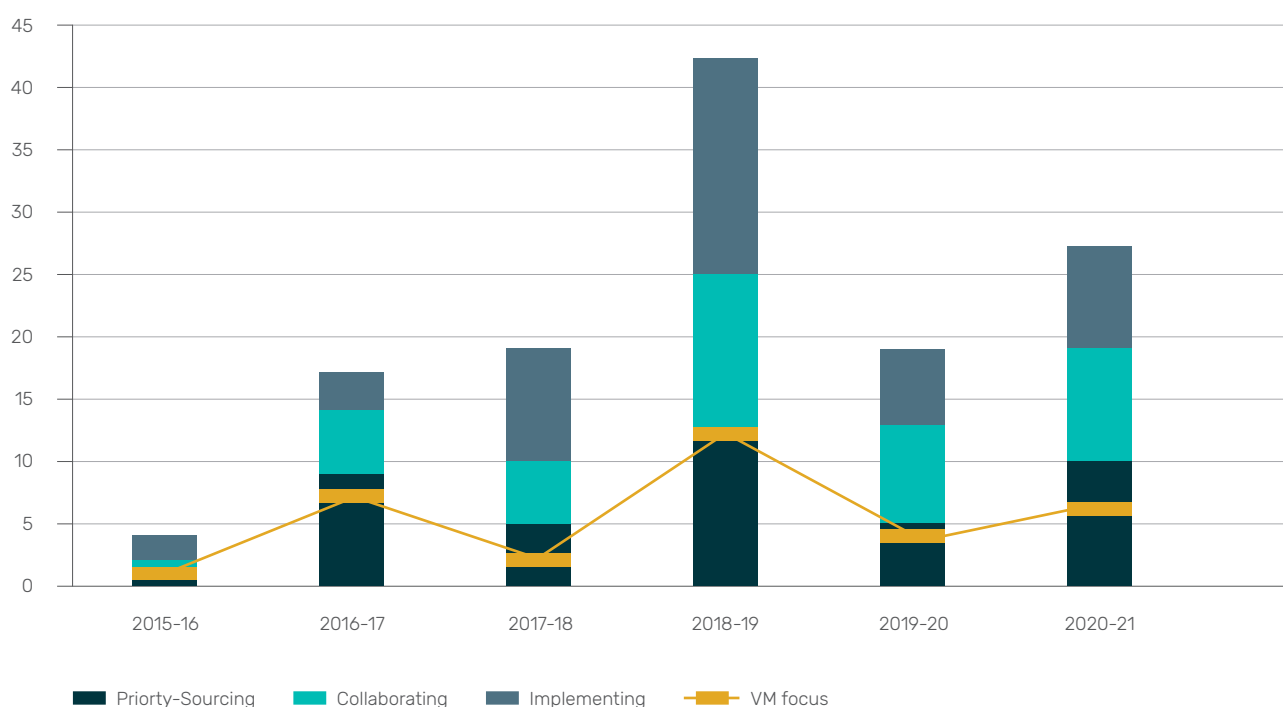Priorty-Sourcing · Collaborating · Implementing · VM focus

Image. Former SfTI Manager Vision Mātauranga and Capacity Development Impact, Dr Willy-John Martin

4

High Impact Areas in the Capacity Development Programme

The All of Researchers' workshop is by far the most popular capacity development activity that SfTI organises, but the Capacity Development Programme has delivered a range of outcomes to many individual SfTI researchers. BNZIC-tracking and the post-event participant surveys indicate that three other types of Capacity Development have the greatest impact overall on researcher behaviour. These three topics align with the three process foci:

Vision Mātauranga Training

Helps researchers to reprioritise what matters (Priority-Sourcing)
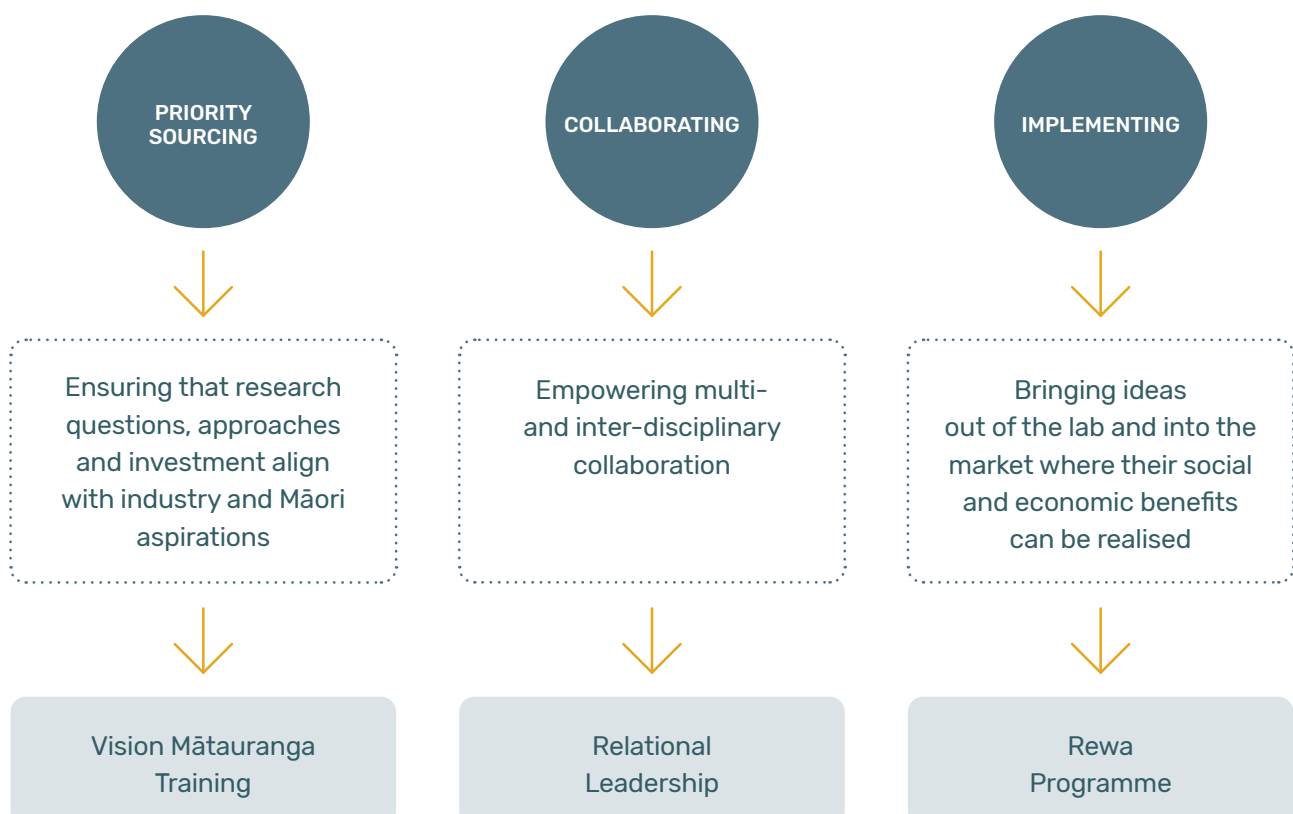
Relational Leadership Development

Helps researchers to lead influentially and enhance collaboration. (Collaborating)

Rewa Program

Helps researchers to understand commercialisation and how to create impact. (Implementing)

Training Delivery Focus Aligned with Target Areas

PRIORITY SOURCING	COLLABORATING	IMPLEMENTING
Ensuring that research questions, approaches and investment align with industry and Māori aspirations	Empowering multi- and inter-disciplinary collaboration	Bringing ideas out of the lab and into the market where their social and economic benefits can be realised
Vision Mātauranga Training	Relational Leadership	Rewa Programme

4.1. VISION MĀTAURANGA TRAINING

Vision Mātauranga training is available to both Māori and non-Māori scientists. One of the most often cited training needs relates to cultural competency, with the more commonly asked questions relating to Māori engagement: "How do we do it?" and "Who do we talk to?". Establishing relationships with Māori can be particularly difficult for researchers with no pre-existing connections into the Māori world or to Māori business.

In the past, researchers have tried to reach out to Māori and Māori organisations without receiving a response. This is because Māori in the science system are inundated with similar requests, particularly during grant application season. This contributes to Aronga Takirua, the cultural double shift that Māori scientists perform in organisations[1], which can lead to burnout. The need to make non-Māori researchers aware of this reality has helped shape SfTI's Capacity Development offering:

"A big part of what we want to do inside Capacity Development is to create legitimate opportunities for you to connect with Māori groups, industry, Iwi and so on. Being in the room is enough to get a really good introduction into how the Māori world generally tends to feel."

(DR WILLY-JOHN MARTIN, PAST MANAGER
VISION MĀTAURANGA AND CAPACITY
DEVELOPMENT IMPACT)

Capacity Development in Vision Mātauranga

Given the demographics of the physical sciences and engineering research community, SfTI is committed to offering enhancement opportunities to Māori researchers (as desired), as well as developing non-Māori researcher Vision Mātauranga competency too.

Developing cultural capacity can be achieved via different methods, many of which SfTI has employed in the Capacity Development programme, including:

- Enabling researchers to attend national hui on topics of significance to Māori such as
  - Indigenous intellectual property
  - Māori Data Futures
  - Indigenous science and technology
  - Federation of Māori Authorities (FOMA) conference
- Enabling researchers to attend workshops on
  - Māori and indigenous research
  - How to incorporate Vision Mātauranga into physical sciences and engineering research in a way that is relevant and useful to Māori
  - Understanding the history and impact of the Wai 262 claim, and implications for the National Science Challenges
- Researchers' self-identified opportunities including
  - Te reo language papers
  - Attending lectures by Māori academics

1. Haar, J and W-J Martin (2021), He aronga takirua: Cultural double-shift of Māori scientists, Human Relations 75(6), 1001–1027, https://journals.sagepub.com/doi/full/10.1177/00187267211003955

Researchers have the opportunity to select their own capacity-building courses offered by external providers. Training has included Te Reo Māori papers, lecture presentations by Māori academics, and a local hapū engagement designed by a Spearhead leader to increase team Vision Mātauranga capacity. The BNZIC team has interviewed participants and found a range of positive effects generated by these experiences, including:

- Change in focus of research agenda toward more societal applications

- Critical reflection on research methodology

- Change in approach to Māori research partnerships: needs-driven vs. solution-driven

- Increased relevance of research through greater connection to end users

- Increased openness to engaging early with a diversity of stakeholders

A. Vision Mātauranga is a Vehicle for Community Benefit

After attending the Bringing VM to Life workshop, in which Vision Mātauranga's original architect explained the policy's founding aims and contrasted this with its subsequent application, one researcher noted that their view of what Vision Mātaurannga is, and could be, was significantly expanded:

"I think if you read the rules on the website, you basically get put off around VM with a technical type project. But if you look at it in terms of community validation ... then it does start to have more relevance. I think what people do is interpret VM as meaning "okay there's this thing called Māori science", but from what this guy was saying, what he intended was that it would be just basic straight science but perhaps infused with distinctive aspects of Māori culture, or some aspect of innovation ... Vision Mātauranga, I realise now, is about engagement."

As a result, this science leader was able to fuse "science and [working] with Māori communities who will be engaged in the [SfTI] project," to realise benefits for Māori communities. In terms of longer-term impact, attending the Vision Mātauranga event influenced how this science leader wrote future grants, composing them "with that workshop in mind" and focusing more on "the people aspects of the project, the engagement aspects."

B. Confidence in Engaging with Māori

Through observation, BNZIC has revealed how important it is to create legitimate opportunities for connection. One science leader who attended the Māori Data Futures Hui described how this event provided a legitimate platform through which to more confidently engage with Māori:

"SfTI making the invite in the first place, when I wouldn't have even heard of this thing let alone signed up for it, was a help. Because of the [SfTI] grant, I had, to some degree, a goal, a reason for being there. You're not just an observer. You sort of have to join in because you want to talk to people about this specific thing … I wasn't just a tourist. I was there like some of the other people were, to do something."

As a result, they "learnt a lot from talking to people" at the hui, but most significantly, their original assumption about Māori needs, which their whole project was based upon, was shown to be incorrect. While the researcher's earlier conception was a common one, "it turned out there's a whole other group of people who think that's exactly the wrong thing to be doing."

POST-EVENT SURVEY FEEDBACK

"It certainly gives me a better understanding of the Māori community and will be very helpful in the future to establish potential partnerships." (FOMA 30 Survey, 2017)

"I identified a lot of other stakeholders in my project and learnt how to categorise them and how to tailor my interaction with them so as to maximise the researcher/engagement ratio. Next steps would be to take the time to sit down and apply the activity to my own project." (Researcher-Stakeholder Engagement Workshop Survey, 2017)

"I built and strengthened relationships across the Māori business sector that will help me figure out ways to create future opportunities for our scientists to connect with Māori businesses." (FOMA 32 Survey, 2019)

A key to the success of SfTI's Capacity Development efforts has been having buy-in from the leadership team, all of whom have participated in the training offered. They have subsequently become champions for the initiative as a direct result of the benefits they experienced. Don Cleland (SfTI Theme Leader) and Stephen MacDonell (SfTI Deputy Director and Theme Leader) have spoken about their journey towards understanding and being able to engage with Māori organisations since attending Capacity Development training.

PROFESSOR DON CLELAND
(SFTI THEME LEADER)

Don remembers having little exposure to things Māori growing up in the rural South Island during the 1960s and 70s. Fast forward several decades and Don has found himself working with many Māori colleagues who have the ability and the passion to articulate and give effect to Vision Mātauranga. "This has led to the realisation that to be a proud kiwi, I need to be a lot more proactive in embracing things Māori," he says.

The Vision Mātauranga training available through SfTI's Capacity Development Programme has been illuminating. Even at a basic level, Don has come to realise the value of the Māori knowledge system and how much it can add to Western science in relation to native flora and fauna, but also with regard to sustainability, underpinned by concepts of intergenerational incentives to do better.

Importantly, this initiative has provided the opportunity to attend several events he would not have otherwise been exposed to; two in particular have left a lasting impression:

1. The Māori Data Futures Hui (Intellectual Property) was held in 2019 at Te Aurere, Kaitaia, home of [the late] Tā Hekenukumai Puhipi (Sir Hector Busby) and Te Kāpehu Whetū (the celestial star compass). Don was exposed to an unfamiliar history of Māori possessing star-based navigational skills that were as good or better than the sun-based navigation of the Western world – this new knowledge has been a highlight for him.

2. Don recently attended a Federation of Māori Authorities (FOMA) Conference where he met with an impressive group of Māori professionals who had a clear passion and valuable skills for growing the Māori economy, a strong commitment to the wellbeing of Māori communities, and who were exceedingly busy.

As he now understands, "the pressure that those individuals and organisations are under is immense. As researchers seeking to get their involvement, we need to be really sensitive to those pressures and be aware of that and not expect instantaneous results or feedback. It's not a one-off shot; it's a journey."

In unreservedly recommending that researchers participate in SfTI's Vision Mātauranga training, Don hopes others can kick-start their own "motivation to take a bicultural approach which can improve your research and add to your life."

PROFESSOR STEPHEN MACDONELL
(SFTI DEPUTY DIRECTOR
AND THEME LEADER)

"It's not always comfortable, but the personal and professional outcomes are really worthwhile."

Stephen began his Vision Mātauranga learning journey within SfTI when he attended a 2016 workshop entitled Bringing Vision Mātauranga to Life. This course was presented in three parts:

1. Exploring the Māori economy

2. Vision Mātauranga and 'how to do it'

3. Building confidence to more fully engage with Māori e.g. protocols

As Stephen recalls, "This was my first exposure to anything to do with Vision Mātauranga and it was totally eye opening. Getting an understanding of the Māori economy, the scale of it, the fact that Māori had been doing business for centuries – I just wasn't aware of it."

Despite his career being firmly situated in the digital space, this was also the first time Stephen had come into contact with leading Māori software companies such as Waka Digital, Kiwa Digital, and Takiwā. The Māori economy is a significant part of New Zealand's economic power, and it is growing quickly in areas outside of the primary sectors. Learning all of this in one

session really highlighted for Stephen the opportunities that connecting with Māori could offer.

Since then, he has attended two Data Futures Hui on Marae. This has been particularly valuable for Stephen as Theme Leader for Data Science and Digital Technologies because he was able to hear Māori perspectives on topics such as data, intellectual property, and Mātauranga Māori; these are admittedly quite different to his own western-centric point of view. "For instance, I think of my personal data as an individual – it's mine. But data for Māori can be viewed as much more collective - it's a whanau thing, it's an iwi thing. It then becomes less about ownership and more about guardianship, kaitiakitanga. So, very different ways of looking at this same concept has helped me to get a better understanding that there are different perspectives," Stephen explains.

The Federation of Māori Authorities (FOMA) was established 30 years ago and represents 160 Māori organisations, but before attending their conference as part of SfTI's Capacity Development Programme, Stephen had no idea it even existed. He was impressed by what he describes as "a real sense of adventure and boldness and ambition in that room," and has since gone on to serve as technical advisor to Te Horipo Karaitiana, FOMA's Chief Advisor Innovation and Research.

Stephen describes some of the foundational learning he has through Vision Mātauranga training as relating to understanding what is important to Māori, including values, tikanga and kawa, the practices and the protocols that work in the Māori world. For example, he now knows that when meeting a group of

people on a hui, where he comes from and who his extended family are is more important than his role as theme leader in the National Science Challenge.

As a result of his experiences, Stephen is approaching his professional activities differently: "I do think more about not just the economic impact of our research, but I think about the social and the environmental and the cultural impact of our research and what it might mean beyond our generation through to our tamariki and our mokopuna, our children and our grandchildren. I know this has made me a better researcher and a better engager with industry and with Māori."

As for those recently discovered companies mentioned earlier, two are now co-funders with Stephen on a proposed MBIE Research Programme. "That was because I took the time to build a relationship with the people. I didn't treat it like I have in the past – send off an email, this is very transactional, very one-off, one-shot. You've got to build a relationship, and it's the right thing to do, it's actually the right way to work. Building a relationship with these companies and the leaders of these companies has enriched my research programme." This positive outcome is in no small part due to the safe, guided opportunities provided by SfTI where researchers can gently engage and learn without judgement.

Summary of the Benefits Observed

- New understanding of Vision Mātauranga and what it encompasses
- Learning Vision Mātauranga as a vehicle for community benefit
- Greater awareness of Te Ao Māori and the Māori economy
- Increased confidence in engaging with Māori
- New networks into/partnerships with Māori businesses and organisations

Image. Participants at the Māori Data Futures Hui (Intellectual Property) at Te Aurere, Kaitaia, home of [the late] Tā Hekenukumai Puhipi (Sir Hector Busby) and Te Kāpehu Whetū (the celestial star compass), 2019.

4.2. Relational Leadership Development

SfTI has provided several leadership development opportunities, and this has been one of the most well-attended areas of capacity development. Offerings have included a three-day relational leadership intensive course, one-on-one coaching with an experienced leadership coach, and the more recently introduced Science Leaders Programme. A key element of this training has been a focus on helping participants identify where the greatest opportunities for impact lie for them and their teams.

Coaching

After completing the Relational Leadership Workshop, researchers have the option of working one-on-one with a coach to identify their highest priority goals using a pre-programme mini-needs analysis. This process enables researcher and coach to develop and enact a personalised leadership strategy through five one-hour sessions over a three-month period.

Post-event survey data (from 2018) shows attendees rated their leadership skills as being higher after completing the training compared with pre-attendance levels. During the pandemic, the programme was moved to a virtual setting but remained well attended and highly valued by the participants.

Shift in self-reported ability levels related to leadership (Post-event Survey, 2018)
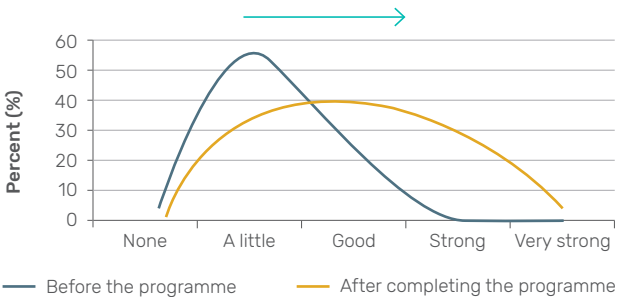
Q: How would you rate your leadership skill level?
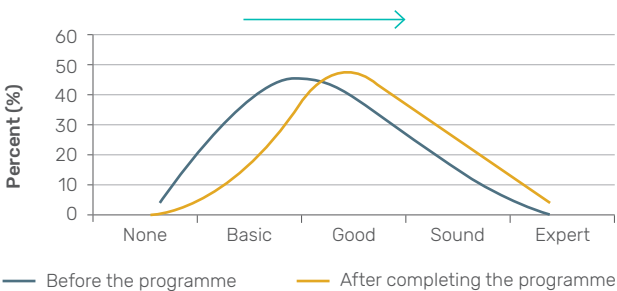
Q: How would you rate your strategic skills?
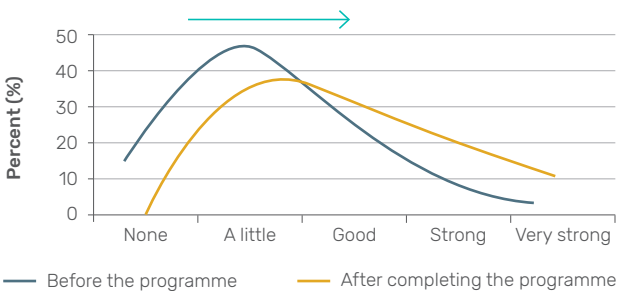
Q: How well could you influence others to do what you would like them to do?

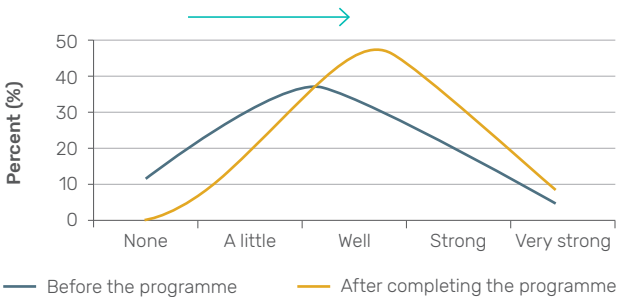Q: How well could you 'walk in the shoes' of others and 'see the world through their eyes'?

Image. Attendees at the SfTI All of Researchers' workshop 2019.

Attendees of the 2018 Relational Leadership Programme reported making a number of changes as a result of the experience. Around two thirds reported that they had experienced worthwhile results due to 'paying more attention to the needs of others', 'thinking about their own reactions', 'being more conscious of their leadership style', and/or 'thinking about or understanding how others might be viewing a situation'. Overall, 39% of those who attended the programme in 2018 reported that the experience had helped them to create 'very positive concrete impact'.

Other comments reveal how this training was experienced:

"One particular thing that I really got out of the programme was the difference from being a manager and a leader. I learnt how to better delegate my tasks and to manage conflict and people in my research team."

(RELATIONAL LEADERSHIP PROGRAMME, 2018)

"Of particular importance to [my] role were subjects such as the identification of adaptive challenges, the different approaches to manage and inspire people at different levels, and effective ways to transmit ideas to higher management levels to my current rank (for example, CEO level). I believe it will help me to perform better as a leader."

(RELATIONAL LEADERSHIP PROGRAMME, 2018)

"Due to its one-on-one nature, it was really tailored to my personality traits and all the advice was relevant and applicable to my situation."

(RELATIONAL LEADERSHIP PROGRAMME, 2018)

PROFESSOR HĒMI WHAANGA
(UNIVERSITY OF WAIKATO –
TE PUA WĀNANGA KI TE AO)
RELATIONAL LEADERSHIP COACHING
(ĀTEA SPEARHEAD)

As part of SfTI's Leadership Development training, facilitator Stephen Neale provided a reading list that enabled participants to delve into different leadership styles and learn how teams function. This learning discovery helped Professor Hēmi Whaanga to identify a mode of leadership that would be most suitable to running his large Spearhead project with team members from across several institutions; new skills were needed because, as Hēmi explains, "I'd managed small teams before, but not dispersed teams."

It was decided that his most pressing task as leader was to help team members understand the context of material they would be working with: stories of and from Ngāi Tahu. This seemed the best way to meet a common tech challenge that Hēmi had been pondering: "When you're working in a digital space, it's the cultural element that's often missing. How do you actually make your colleagues connect to the stories that you're talking about? You need to take them to where those stories were actually created. You need to go out and feel the wind down at Ōreti …". A trip to Te Rau Aroha Marae was planned for all researchers and their families. Hēmi wanted everyone to experience a powhiri, participate in whakawhanaungatanga, and meet with the haukainga who would ultimately be sharing their knowledge.

In the event, says Hēmi, the trip worked as intended, with stakeholders from Awarua Rūnanga, University of Otago and University of Canterbury, able to share their aspirations for the project, respective roles, and the practical actions they would take. Ultimately, "finding common agreement on how we were going to do things really saved me time," he explains. But it was more than that; Hēmi wanted to ensure that when team members spoke on behalf of the rūnanga, they had "seen our carvings, slept in our Marae, and spoken with the locals," and from this foundation, could take context into account when making decisions.

While Hēmi says he may have used this general approach anyway, leadership coaching provided time to reflect and learn from an expert, and as a result, they were able to create a more focused plan for team building, particularly for bringing computer scientists into a cultural context.

DR RICHARD PARKER
(SCION – ROBOTICS) RELATIONAL
LEADERSHIP COACHING (ROBOTICS SH)

Dr Richard Parker is based at Scion and works on SfTI's Robotics Spearhead. He remembers what initially prompted him to sign up for Leadership Coaching: "Scion has a lot of biologists in it, and botanists and soil scientists and people like that, and they don't really get excited about robots. My goal was to try and get my colleagues to see that robots are more than just fun, that they have a serious purpose."

Through Stephen Neal's one-on-one coaching, Richard developed a strategy and learned some skills necessary for increasing his influence inside Scion.

An important focus for Richard was gaining a clear view of the organisation's internal networks – how information flows, where relationships connect, and who the decision makers are. One piece of 'homework' aimed at revealing hidden aspects of this workplace was to create a diagram showing how, and how strongly, people were linked together within the organisation.

Learning to identify and connect with decision makers is particularly important for researchers. Quiet people with low profiles can have a big influence on the organisation, and as Richard came to realise, "You don't have access to them unless you muscle up to the door and knock on it, come in, and actually talk to them."

Richard was also challenged to engage with a board member; he had been at Scion for many years but never had this kind of contact before. As it turned out, the board member Richard approached was entirely receptive, and a positive relationship has subsequently developed.

By all accounts, Richard's efforts have been a success: "The botanists and the soil scientists now get quite excited about how robots can save the soil, and how you can save plants by using robots." As a result of improving his ability to influence others, there is greater enthusiasm from those in the natural sciences to step outside their comfort zone to create science for the benefit of Aotearoa New Zealand.

DR MARIE-JOO LE GUEN
(SCION – MATERIALS, ENGINEERING AND MANUFACTURING)
RELATIONAL LEADERSHIP COACHING

When Marie-Joo was awarded her first large research grant of around $1 million, she realised she would need to start connecting more with other scientists and incorporating their work into her larger projects. Of course, scientists are very busy people so persuading them to prioritise her requests would be important.

As Marie-Joo remembers, "I got my first major grant and I was on top of the world … and then the stress came in and I wondered: How am I going to deliver that?"

While SCION is a nurturing environment for early-stage researchers, Marie-Joo realised she needed help if she was going to negotiate her professional relationships effectively, so the opportunity to be coached in Collaborative Leadership was a godsend.

She worked with Stephen Neal to first understand herself and how her colleagues perceived her, and then she was coached in actively exploring and influencing her work environment.

At SCION, researchers are matrixed. They can ask others in the wider organisation to join a project if their skills are useful – this means that people's time is fractionated across a number of projects. While multi-domain research can lead to great innovation, "it can be hard to engage with people deeply to convince them to do stuff." This had been quite difficult for Marie-Joo initially.

Through working with Stephen, Marie-Joo learned a range of specific tools that she could apply on a day-to-day basis with colleagues to help bring her fellow scientists on board to achieve her project's goals. She took the time to trial these tools to recognise what worked in practice, and then fed back the results to her coach.

The 'Offer and Expect' technique was especially useful; offering to take some project-related action and then telling colleagues what is expected from them. "That tool was amazing," says Marie-Joo. "If I only have one tool I choose to keep on using, it would be that one because it made people feel they were part of a team, that they were not alone."

Ultimately, Marie-Joo's experience of leadership coaching has been an extremely positive one. Thinking about it now, "I was an early career researcher and did not have that much experience in leadership, but thanks to the programme, I learned a lot and much faster than I would have done by myself. The programme was tailored to my own situation, which made a great difference when applying it".

Less than three years since completing the programme, Marie-Joo has gone on to manage two Research Groups at Scion. She is currently Research Group Leader of the Materials, Engineering and Manufacturing group and Acting Research Group Leader for the Data and Geospatial Intelligence group. "That course really started me on an incredible journey. I am really grateful to have had such an opportunity at that time of my career," she says.

Science Leaders Programme

In 2021, the Challenge introduced the 8-month Science Leaders Programme (SLP). Due to Covid-19-related uncertainties, the programme was delivered primarily online through video-based learning modules, group mastermind/action learning sessions, and 1-on-1 coaching calls. In addition to course time, attendees were also recommended to spend at least 1-2 hours per week extending their learnings.

This course is designed to develop researchers' leadership skills through focusing on three areas:

1. Confident leadership, including how to build and maintain high levels of confidence, and unlocking the full range of one's leadership abilities.

2. Leading for influence, including how to be highly influential leaders across a variety of contexts.

3. Leadership intelligence, including strategies for navigating complexity and uncertainty, and understanding one's decision-making strengths and how to harness them.

"The course has been perfect for me... I've been thrown into leadership roles and the course has given me the confidence that I can do this. And it's given me the tools to influence people to get to where we want to be."
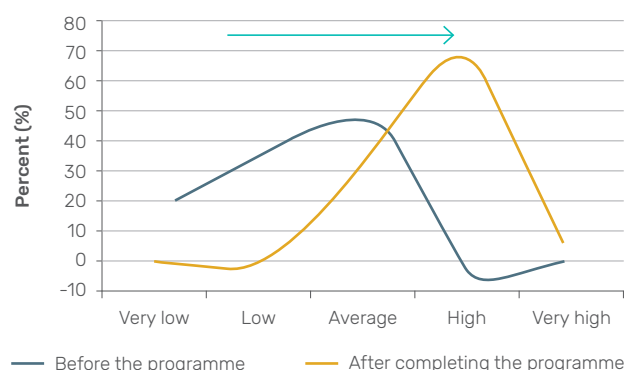
(DR TE TAKA KEEGAN, CO-CHAIR, SFTI BOARD)

Attendees of the inaugural programme were surveyed (n=15) to gather their thoughts on the training. They were asked to compare their skill and confidence levels before and after attending the Science Leaders Programme: the graphs below show a clear shift to the right in terms of self-perceptions, indicating the course had a positive impact.

Shift in self-reported ability levels related to leadership (Post-SLP Survey, 2021)

Q: My overall leadership skill

— Before the programme   — After completing the programme
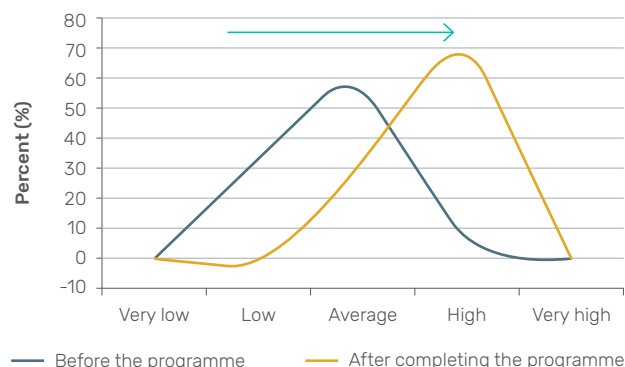
Q: My confidence in my ability as a leader?

— Before the programme   — After completing the programme

Attendees had the opportunity to add verbatim comments to the ratings, and offered some insights into the particular benefits they experienced:

"I feel more confident in my skills and have a go-to toolbox of tips and techniques to use when required."

"I'm more aware of the skills that are involved and I'm consciously using them more often than not to get the intended outcome. So far it's more influential than outright leadership - so far."

"I understand the ways in which I was already an effective leader. And I am more realistic in my expectations."

"I understand what I need to tap into to find the right motivation and the flow on effect of that is confidence."

Attendees were asked how they had applied their learnings in their role. At least four out of five attendees reported each of the following actions:

- Pay more attention to the needs and concerns of others (86.7%)

- Challenge my thinking and assumptions (86.7%)

- Seek opportunities for making more of a contribution (80%)

- Reflect on my experience as a basis for improvement (80%)

Attendees were also asked to select from a list of outcomes that resulted from applying course learnings. At least two thirds of respondents reported: 'understanding what leadership means for me in my world' (80%), 'having greater confidence in my leadership style or approach' (73%), and 'having greater confidence in working with others' and 'being more proactive in the face of work-related challenges/trajectory/progress' (both 67%). Other frequently mentioned effects included: 'being more comfortable in dealing with novel or messy problems' (60%), 'being more influential across a range of settings' and 'building stronger relationships' (both at 53%), and 'thinking more deeply about the challenges and possibilities of my world' (40%).

While several participants said that despite valuing the programme overall, face-to-face time would have been beneficial to help the group get to know one another better. General reflections on the Science Leaders Programme were positive, including:

"Keeping a list of things you achieve daily, big or small, and reflecting on them weekly = super great exercise for my own mental well-being. The active listening and repeating the conversation back to the person has also been pretty good, so much so that my son has picked it up too."

"That there is no one way to be a good leader. Good leadership takes on many forms and I now have a deeper understanding of how certain skills and tools work best for my own leadership style."

"My key take-away from the SLP was identifying my criteria/motivation for decision making in relation to my role as a leader. 'Lightbulb' moment."

Summary of the Benefits Observed

- Increased relational abilities, including a heightened sense of empathy, and better communication skills

- Practical skills such as project management and ability to maximise teams

- Increased personal confidence to lead and influence

- Wider networks and new collaboration opportunities

- A tendency to prioritise impact and values-based innovation

- Enhanced career planning and connections

4.3. REWA (PRE-ACCELERATOR PROGRAMME) AND REWA AKE (CUSTOMER DISCOVERY WORKSHOP SERIES)

The Capacity Development Programme takes advantage of a range of courses and programmes offered by external organisations. One is Kiwinet's Rewa initiative, which was offered for the first time in 2020. The name Rewa (to be elevated) was chosen carefully to reflect the initiative's aim of elevating participants, their mentors and their science ideas. Rewa was modelled on training called 'ON Prime' by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO).

For New Zealand's first intake, seven teams from public research organisations took part in a process of validating their proposed tech solutions with reference to a real-world problem. The emergence of Covid-19 resulted in the first version of the programme, called Rewa Pre-Accelerator, being delivered completely online by the Australian Facilitation team. It started with an initial four-day immersion workshop held via Zoom and Slack, and a subsequent expectation for participants, guided by expert mentors, to complete up to 100 market interviews as a key part of their customer discovery and market validation activities. Research teams would learn enough to either modify or discard their ideas.

IMPACT EXAMPLE

The Challenge has seen Capacity Development starting to shift very entrenched ideas and related behaviours about what is impactful in science and research. One science leader described how having capacity development at the beginning of their project changed their view of what impact was. Specifically, away from traditional academic ideas of publishing and going to conferences (which they described in hindsight as being very short-sighted), to engaging with partners, particularly Māori partners, and identifying steps that were outside of typical academic expectations to create impact for those groups. BNZIC will be investigating these changes in perceptions and behaviours further and reporting the findings within the final capacity development report.

Attendees of this first Rewa programme were surveyed[2]. When asked if they would recommend Rewa Pre-Accelerator to a colleague, 92% responded with 9 or above on an 11-point scale (where 1 represented 'extremely unlikely' and 11 represented 'extremely likely'). Respondents gave a variety of reasons for their score, including:

"Great advice and practical tips, learnt so much and got so many tips from the conversations with customers."

"Learning of skills to obtain valuable information for the commercialisation process."

"It was a great experience for me, and the workshop really reinforced the learnings in the theory session."

A common recommendation for improvement offered by attendees was to have more time for the customer interviews, given how time consuming this task was. But overall, general feedback was positive.

"I would not have started having these conversations until much further on in the project but there were so many benefits in having the conversations much earlier and also in developing the ecosystem, so I had conversations with a broad range of customers."

"Building trusting relationships is a special skill and maintaining those relationships is gold."

Image. SfTI researchers are offered training in pitching the potential impacts of their work on camera.

2. Survey administered in September 2021, n=14.

IMPACT EXAMPLE

Lab in a Box

Juan Schutte and Jean-Henri Odendaal were two SfTI researchers who went through the first Rewa programme in 2020. The pair agree that the programme was useful to gather potential end-users' perspectives, and the process helped them see how "young" there Lab in a Box product still was.

They learned that there were specific ways of doing market validation most effectively, particularly when speaking with potential end-users, and how to structure short interviews and translate notes into useable insights. As Juan notes, "Rewa provided an opportunity to develop and practice skills outside of our normal work. It highlighted another world and the expectations in that world. Even our language has changed, we stopped using big words and jargon."

Having the support of SfTI's Innovation Manager, Enrico Tronchin, "helped guide and normalise some of the ideas – 'just try it this way, it might be annoying, but let's see what happens,' he would suggest," remembers Jean-Henri.

A key benefit of the programme, says Juan, was how "It takes you out of your echo chamber". Prior to Rewa, the pair had assumed that everyone would be interested in the Box, but it became clear that some industries would find it useful, while others did not need it at all. The danger of feature creep was also highlighted as interviewees each said they wanted a different thing depending on their needs, so "the programme pointed us to the MVP approach, we focused on forcing constraints so that we could talk to industry". Ultimately the two most promising forms for the Box were materials processing and data generated from that.

For these two, the time commitment needed to complete around 100 end-user interviews seemed somewhat extreme. However, because they undertook the programme during Covid-19 lockdown, their normal work commitments had lessened, allowing the time to be spent. Jean-Henri noted though that during normal times, "the time commitment would become so overwhelming you'd drive [participants] to exhaustion".

While there was some ongoing collaboration between Juan and Jean-Henri after the initial SfTI funding came to an end, Juan says Lab in a Box has not progressed further towards commercialisation. This is in part due to new work and study commitments, and partly because a new round of funding was not available.

IMPACT EXAMPLE

The Bloodless Blood Test

Several junior members of SfTI's Home and community-based care – Type 2 diabetes Spearhead project took part in the 2020 Rewa Pre-Accelerator programme. They have been developing needle-free, light-based glucose sensors which allow quick and accurate blood glucose readings to be taken in the home without pricking the skin.

Jake Campbell and Jennifer Knopp headed this team of four, which together interviewed 100 people. Jake explains how impactful the opportunity was:

"The SfTI research project is my PhD thesis looking at non-invasive measurement of glucose in the blood. Through Rewa we were encouraged to expand the research to analyse other components of blood, but the core research remains around glucose monitoring.

We applied to Rewa to explore the commercial opportunities and pathway to take the research once it leaves academia. As our group were all academics (PhD students and post doc (Jennifer)) we didn't have much experience in commercialisation for research projects. For skills to improve, we were keen to learn how to formulate/pitch ideas and to gain confidence in public speaking.

We were lucky to have two incredibly helpful mentors in Lance Chia and Clive Seymour from industry and Alexandra and Hamish from KiwiNet. They taught us so much about taking ideas from paper into a useful device.

The main takeaways we had from the project were the importance of customer interviews to get the pains and gains which drive the direction of the project. Rewa also taught us the importance of dual streaming research and commercial activities as they complement each other. Through the program we crafted a business plan, gathered market data from 100 customer interviews and gained access to incredibly useful networks.

The direction of the project shifted after Rewa. After the customer perspectives we were able to pivot the device and its uses which we would not have otherwise known to do. The program helped give perspective on the real-world use of our research and to apply this learning to the other PhD research projects that team members Sarah and Lachlan were simultaneously working on."

As a result of feedback from the first two rounds of Rewa, changes were made to the programme, albeit with the central premise remaining the same. Particularly with the aim of reducing the time/resource commitment for both participants and their organisations, the number of recommended interviews was scaled back to just ten, and facilitated sessions were reduced to three half days. Funding changes were also made to ease any administrative barriers. The improved offering, Rewa Ake, was offered for the first time in 2022 over March and April, and was facilitated by Ian Storie, together with Enrico Tronchin, SfTI's Commercialisation and Development Manager, Ryan Rangiwhetu, Sfti's then Advisor for Vision Mātauranga and Capacity Development Impact, and Seumas McCroskery, Commercialisation Manager at KiwiNet.

Participants of the new and improved offering were surveyed[3] for their feedback. In terms of whether they would recommend the programme to colleagues, seven of the eight respondents said 'yes' and one responded 'maybe'. When asked what value the programme delivered, responses included:

"Being active in talking about my project to people in different parts of the ecosystem map, learning how to communicate the ideas of my project without too much jargon. Learning what were key elements when having a conversation to not sway the outcome in any way. I also got a lot of good insight from the conversations I had on directing my project."

"The course encouraged me to have difficult conversations with end users."

"Forced me to think critically about my skillset related to engagement with others. Introduced me to a range of people, which has positively expanded my networks. Forced me outside my comfort zone (in a good way)."

"I got the courage and contact to go out and talk to potential customers. From this, I've built my network and greatly developed my value proposition and customer segments."

Summary of the Benefits Observed:

- Increased confidence to engage with industry

- Wider industry networks

- Greater ability to communicate science to wider audiences, for example, describing benefits rather than features

- Opportunity to develop useful skills outside of the status quo

- Becoming 'media-ready' in order to grasp opportunities as they arise

3. Survey administered after programme completion, n=8.

5

Conclusions – What Seems to be Working

This is an interim report which has canvassed the attendance patterns and reflections of those involved, as at the end of 2021. Some anecdotal evidence of significant behavioural change has been observed. However, to be able to make more substantial claims about lasting behavioural changes, the SFTI Capacity Development secretariat and BNZIC will conduct a survey of all current and past researchers in the next year, in preparation for a final report to be produced in the 2023-2024 year.

Across all capacity development activities to date, SfTI has observed several broad impacts:

- **Enhanced personal confidence.** Feedback provided by participants attending the range of capacity development offerings has indicated increased confidence for engaging in all manner of activities. Researchers are reporting a greater willingness to extend their leadership potential, in part supported by new tools they have had the opportunity to test, and this is both creating more effective teams and supporting career progression (including for early career researchers). Another common benefit has been greater confidence around working with non-researcher groups (as discussed below).

- **Improved ability and willingness to seek out others' perspectives and to integrate subsequent new understanding into their research.** More specifically, attending the training events has increased the likelihood attendees would seek to partner (or co-design) with potential end-users, including Māori and industry, to help guide their research towards achieving beneficial impacts for New Zealand. This can be seen for example in increased use of Te Reo and understanding of Tikanga, on the part of Pākeha researchers, as well as the willingness to explore that new understanding with Māori communities and businesses. Those that undertook science leadership training, have also reported more empathy for team members, allowing them to communicate better and lead more influentially.

- **Increased networks inside and outside the research community.** Many new connections have been made via the capacity development events that were unlikely to have been made otherwise, including with other researchers and decision-makers in Māori businesses and communities, and industry. This has been important across the board to help researchers understand what others are need, to identify opportunities for collaboration, and to help with career progression.

- **Guided practice of new behaviours appears to cement behaviour change.** An important aspect of some capacity development trainings has been the opportunity to apply new learnings with the oversight of experts, for example, in the Science Media Savvy Workshop where researchers pitched their ideas to working journalists. The Rewa Programme taught participants to construct discussion guides and conduct interviews before they were sent out to speak to industry informants. Similarly, Relational Leadership Coaching involved setting specific tasks that could then be subsequently reviewed together in session. Practice left researchers feeling confident to continue with these activities on their own in the future.

'Enhancing capacity' is explicitly a part of SfTI's mission. What that entailed was not defined so the SfTI Leadership Team and Programme Office has taken the opportunity offered to develop a range of options. It could be argued that this professional development should be the responsibility of the researcher's employer, although it is unlikely that such a range of options (particularly in the Vision Mātauranga space) are readily available. In addition, our experience is that researchers do not

Images. A SfTI Mission Lab in 2019 drew together interested Rangatahi and Rangatahi researchers..

necessarily wish to take time out of their 'day-job' to learn or extend their current skills that may be viewed as peripheral to the core activity of science. However, the evidence gathered so far indicates that once researchers do get over this perception hurdle and engage, they find the experiences very useful and satisfying.

This is particularly true of the three most highly valued offerings; leadership training and coaching, exposure to a variety of Vision Mātauranga related events and the Rewa Ake commercialisation programme. Our leadership coaches observed that many of the attendees had very little prior knowledge of leadership concepts but once exposed to some, they grabbed the opportunity to apply them with gusto. The Vision Mātauranga experiences make the unknown become known

for our researchers and open a new world of possibilities for collaboration. Rewa Ake and commercialisation initiatives will not, and do not intend to, turn every researcher into an entrepreneur, but the enhanced understanding of what commercialisation entails will enable them to engage earlier and constructively with technology transfer experts leading to potentially far greater impact from their research. The fact that the capacity development programmes are very flexible and tailored to individual needs is also of great benefit to the researchers. Thus, SfTI views its capacity development programme as possibly the most comprehensive available to New Zealand researchers and that it is augmenting substantially what is available in the rest of the research system.

APPENDIX A:

Listed below is a selection of training made available through the capacity development programme categorised by their process orientation, together with attendee feedback and early findings from BNZIC research:

Priority-sourcing | Ensuring that research questions, approaches and investment align with industry and Māori aspirations

EVENT	FEEDBACK FROM PARTICIPANTS GATHERED VIA POST-EVENT SURVEYS, AND SUMMARIES OF WHAT BNZIC DATA SHOWS WERE THE BENEFITS DELIVERED FOR PARTICIPANTS
Federation of Māori Authorities Hui Ongoing FOMA meetings provide the opportunity for SfTI researchers and management to network with those in the Māori business sector who are interested in R&D.	"The FOMA attendees are senior decision makers and it's great to have a chance to talk to them. The presenters were excellent and taught us a lot." (post-event survey) "The positive Māori vibe! Tu meke" (post-event survey)
Māori Data Futures Hui • Māori Data Futures (2018) • Māori Data Futures; Intellectual Property (2019) The 2-day Intellectual Property Hui explored intellectual property and knowledge protection when working with Māori data.	"We discussed the development of our own independent data as iwi and/or hapū, or Māori organisations, we discussed mana tangata, i.e. respect for people who contribute data, we discussed values and kaupapa, and the need to build capacity and capability." (post-event survey) "I would recommend this hui to others because more people need to understand how important it is for us to tell our own stories in a way that truly reflects Māori." (post-event survey) Benefits delivered: Pākehā engagement with Māori in Māori spaces. A sense of legitimacy for Pākehā researchers to be participating in Māori spaces – a reason to be there. New understanding by Pākehā researchers that Māori worldviews and beliefs are not homogenous. Critical reflection by Pākehā researchers on their assumptions about Māori beliefs and needs.
Researcher-Stakeholder Engagement Workshop Facilitated workshop providing strategies for engagement tailored to stakeholder segments.	"Great set of tools to help to effectively work with multiple stakeholders in most research contexts." (post-event survey) Benefits delivered: • Improved ability to communicate science • Improved business etiquette
Bringing Vision Mātauranga to Life Facilitated workshop covering Mātauranga Māori and how to embrace Vision Mātauranga in research from a Te Ao Māori perspective.	"Very relevant. We will apply the principles towards adding to the community environmental/health knowledge and hopefully improve the potential for management." (post-event survey) Benefits delivered: • Expanded comprehension of Vision Mātauranga beyond the online definition, applied in subsequent grants • Increased weighting to 'people' aspect in proposals submitted.

Collaborating | Empowering multi and interdisciplinary teams to collaborate

EVENT	FEEDBACK FROM PARTICIPANTS GATHERED VIA POST-EVENT SURVEYS, AND SUMMARIES OF WHAT BNZIC DATA SHOWS WERE THE BENEFITS DELIVERED FOR PARTICIPANTS
Relational Leadership Workshop This course covers aspects of leadership including: why and how good leadership is important, leadership styles, understanding others, confidence, and navigating ambiguity. Participants were offered one-on-one follow-up coaching to help personalise these initial learnings	"I will be encouraging many of my colleagues to participate if it runs again. The wide applicability of the skills and thought processes, particularly within the Crown Research Institute environment are excellent." (post-event survey) Benefits delivered: • Improved relational abilities • Increased empathy in leaders of science teams • Increased confidence in ability to lead & influence • Improved ability to communicate • Ability to optimise teams • Visibly improved project management leading to increased delegation at work • Personal affirmation
Leadership Coaching This one-on-one coaching is aimed at advancing researchers' leadership skills and science career goals. In the year to June 2020, a total of 27 sessions were delivered to 9 SfTI researchers. The first group-coaching has also been trialled successfully within the Ātea project, with 9 members in attendance.	"This programme gives the opportunity to sit with an expert to understand my own strengths and weaknesses." (post-event survey) "That mentorship and guidance on a one-on-one basis is very powerful. We don't get much of it. I think if New Zealand wants to build its capacity to do high quality research in the sense to innovate – you can't teach innovation. You can allow innovative people to do their thing, and this I think, allows innovators to be more effective." (post-event survey) Benefits delivered: • Shifts in perceptions of the self • Reprioritisation of impact over academic outcomes • Career changes • Increased goal orientation • Improved time and project management • More values-based innovation and research • More Systems 2 thinking
All of Researchers' workshop An annual event for SfTI which provides the opportunity for researchers to come together with stakeholders from our Board, Kāhui, Rangatahi, government and business stakeholders.	"The rangatahi presentation was especially interesting. Having Rangatahi/Early Career Researcher representation at senior level within SfTI is something I really hope becomes a strength." (post-event survey) "I thought it was quite refreshing to actually be able to interact with the other SfTI teams, and to see actually what most of them are working on. Yeah, it's quite – I would say – an eye-opener to what's going on around, because most of the funding projects that I was involved in in the past are very isolated." (post-event survey) Benefits delivered: • New networks with previously unknown Māori researchers • Networking opportunities with industry partners that weren't' viable before. • Ideas for new applications of Seed technology • New collaborations • A job offer for an early career researcher • A sense of connectedness and community among the NZ research community
Building Better Faster Collaboration It focused on improving skills in fostering relationships and developing stronger networks with industry. Implementation	"All the segments managed to fit together at the end to provide a very useful base to move on in the future. The team dynamics (personalities, team performance), examples, networks and communication (meetings, active listening etc.) were very useful. Thank you also for organising the 'matchmaking' session at the end!" (post-event survey) Benefits delivered: • Improved ability to communicate science • Improved business etiquette

Implementing | Bringing ideas out of the lab and into the market where their social and economic benefits can be realised

EVENT	FEEDBACK FROM PARTICIPANTS GATHERED VIA POST-EVENT SURVEYS, AND SUMMARIES OF WHAT BNZIC DATA SHOWS WERE THE BENEFITS DELIVERED FOR PARTICIPANTS
KiwiNet GetFUNDED These trainings, led by KiwiNet, focused on developing research commercialisation skills for both researchers and management.	"It is a great introduction to developing a customer-focused business case around a technology or idea." (post-event survey) Benefits delivered: • Researchers proactively engaging with industry • Industry advice adopted by researchers, increasing their product's viability. • Commercialisation experience that early career researchers put on their CVs. • Increased confidence engaging with industry after the event. • Industry connections.
Accelerate Your Impact Pitching Competition Researchers competed to deliver the best 5-minute pitch on potential impacts of their project.	"The workshop was so informative and you gain a bit of confidence in yourself when speaking. The skills are applicable to lots of things, not only pitching." (post-event survey) Benefits delivered: • Improved ability to communicate science. • Development of early career researchers' communication skills • Nudging researchers out of status quo behaviours i.e. opting into something they normally wouldn't.
Science Media Savvy Workshop Media training that included a practical assessment and feedback on researchers' oral communication abilities.	"We had a hui the week following [the training] and I was ready to talk to the media – I didn't need to but I had my pitch and three points all ready." (post-event survey) "So, I did this course and you have to pitch your idea to a bunch of journalists, so, then that got picked up by the journalist that came into the lab, and they filmed everything and we went on TV… it was fun. Then you get a lot of emails from people who are keen, and people wanting to buy the technology." (post-event survey) Benefits delivered: • Proactive engagement by researchers with media leading to three radio interviews and one print article • Increased confidence in science leaders to engage with media

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