A values-based process for cross-cultural dialogue between scientists and Māori

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Abstract Cross-cultural dialogue is an essential part of the evaluation of controversial technologies and research proposals of significance to indigenous peoples. If Māori in Aotearoa/New Zealand are to benefit from these technologies it is important that effective processes are developed and implemented to ensure enduring outcomes for their communities. We describe a deliberate, multi-stage process to facilitate cross-cultural dialogue that starts well before research applications are submitted to funding and/or regulatory agencies. The process begins with provision of "toolkits" to both the research provider and the Māori entities, which allows both to be better prepared to engage in constructive dialogue with each other concerning the proposal and its intended outcomes. The process allows for the evaluation of technologies and modification of research proposals by Māori to achieve mutually beneficial outcomes. It also recognises that non-Māori scientists are often willing to participate but may feel apprehensive because of unfamiliarity with the language, protocols and values. The process suggests the use of a Māori intermediary/ies (MIs) to assist scientists with re-evaluation of their proposals prior to the actual dialogue phase, and facilitate the interaction between the dialogue partners. The process accommodates a range of possible outcomes from the dialogue phase, and subsequent monitoring of outcomes from the research by both parties. We also demonstrate application of the process with a case study based on recent experiences from a field trial of genetically modified *Pinus radiata* D.Don. It is anticipated that adoption of this values-based process by scientists and scientific organisations will result in the transformation of science praxis, the creation of long-term relationships between scientists and Māori, and mutually beneficial outcomes for both.

Keywords engagement processes; Māori; indigenous cultures; research proposals; values

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INTRODUCTION

In New Zealand, the science community is increasingly embracing the unique contributions that Māori can make to scientific research. However, successful integration of beneficial outcomes from research requires effective communication between scientists and Māori. The need for constructive cross-cultural dialogue is accentuated by controversial technologies (such as genetic modification (GM), nanotechnology, xenotransplantation). Developing improved methods for dialogue between scientists and Māori for these technologies should lead to better outcomes for all stakeholders.

In a recent example of controversial technologies, Māori views have typically been dominated by the non-indigenous majority in decision making processes around genetic modification and this has eroded trust of scientists by some Māori (Cram et al. 2000; Jackson 2004; Cronin & Jackson 2004; Roberts & Fairweather 2004). Failure to engage in adequate dialogue with Māori has often led to resistance and reduced acceptance that benefits might arise from such technologies (Cram et al. 2000; Roberts & Fairweather 2004).

While there are many examples of scientists successfully engaging with Māori regarding non-contentious technologies (e.g., Cram et. al. 2002), the average non-Māori scientist may struggle to confidently engage with Māori on potentially controversial issues. So how can we increase the confidence of scientists to engage with Māori and simultaneously ensure Māori views will be listened to, and their values incorporated to improve outcomes? One way is by bringing both parties together in an atmosphere of mutual respect, and establishing a safe environment for Māori and scientists to interact with and learn from each other. In order to move forward, scientists will need to overcome perceived cultural barriers and take the time to listen, learn and understand that the values and guiding principles that Māori live and view the world by are different to European New Zealanders. Furthermore, any proposed framework must be consistent with tikanga Māori and uphold and respect Māori knowledge systems, values and philosophies.

In recent years, processes that include the consideration of Māori values have been implemented in some sectors, such as health and education (Pere 1988; Durie 1994; Palmer 2002) and land management (Harmsworth et al. 2002). In areas of Western science, good practice guidelines have been developed by Cram et al. (2002) and Harmsworth (2005). In response to challenges posed by genetic modification, several frameworks have been proposed to address Māori concerns. For example, Durie (2004) posited a framework based on three domains: the natural environment (Te taha taiao), the human condition (Te taha tangata), and procedural integrity (Te taha tikanga), encompassing a number of Māori values and concepts. Mead (2003, pp. 335–350) proposed an approach involving a series of questions and tests for evaluating the new technology in terms of consistency with Māori values, and key Māori principles. Protocols for incorporation of Māori perspectives as part of legislative requirements under the Hazardous Substances and New Organisms (HSNO) Act (1996) have also been developed by the Environmental Risk Management Authority of New Zealand (ERMA 2004). A research project aimed at elucidating Māori views and values concerning genetically modified organisms (Satterfield et al. 2004, Finucane et al. 2005) has developed a cultural risk assessment process based on their findings (Satterfield & Roberts 2008).

All of these frameworks make useful contributions, however each would require users to have good knowledge of Māori traditions and values, and this is unlikely to be the case for the average scientist in New Zealand. Our process seeks to address this problem by providing information on Māori values for use by non-Māori within a contextually appropriate environment in order for both to engage in cross-cultural dialogue about controversial technologies.

The aim of this paper is to present a process for facilitating effective dialogue between scientists and Māori that will lead to mutually beneficial outcomes around potentially

controversial technologies. The purpose of this process is not only to build a framework for dialogue where information is shared, but also that joint decisions can be made about what mutual benefits can be derived from the research. We believe there is value in building enduring relationships between Māori and scientists. Such relationships will facilitate processes for taking full advantage of the potential research and development opportunities associated with working with whanau, hapu and iwi. It will also bring us closer to Ministry of Research, Science and Technology Vision Mātauranga policy framework goals (MORST 2005) of using the uniqueness of Māori knowledge to create innovation in research, science and technology for the betterment of all New Zealanders.

METHODS

To assist in developing a process for interactions between scientists and Māori we utilised the expertise of a national advisory committee, "Te Aroturuki". Te Aroturuki is a pan-tribal group established in 2002 to advise, monitor and interact with scientists working on genetic modification at Scion (New Zealand Forest Research Institute Ltd). Te Aroturuki was established with the mandate from both the rangatira (chiefs) of the hapu (Ngati Tuteata) within whose traditional tribal boundaries Scion's main campus is located. Members were selected for the range of skills, science and qualities they brought to the group. Te Aroturuki is also complemented by both a Māori and New Zealand European scientist from Scion to represent Western science perspectives. To expose Te Aroturuki members to the environment of both parties, hui (meetings) usually took place both on the campus of the research provider (Scion) and wānanga (workshops) at local tribal meeting places of Māori.

We started process development by reviewing the literature to identify "best practice" for Māori engagement and consultation practices, which could fit into such a process. Although some of the existing models provided a strong ethical and theoretical basis for evaluating controversial technologies, it was felt that these models each required significant modification to be applicable in a practical science setting. Nonetheless, various components have been utilised for the process presented in this paper.

To assist with the process development, various versions were tested, discussed and debated among both Māori and non-Māori scientists, the Māori Business Development staff, and some of the senior managers employed by Scion. The process was also shared with others outside of the research organisation that had an interest in developing better processes for interactions with Māori. These included the National Network of Māori Resource Managers (2004); Te Whare Wānanga o Awanuiārangi (2004); past and present members of Nga Kaihautu Tikanga Taiao as well as Kaupapa Kura Taiao (the Māori unit of ERMA (2006)) and Te Ara Putaiao (collective of Māori managers from Crown Research Institutes (2007)). After these interactions, the process was successively modified to incorporate suggestions. This paper represents the final stage where we believe a sufficiently robust framework has been developed.

TE AROTURUKI PROCESS

Overview

The framework follows a logical process of interaction between local Māori (Tangata/Mana Whenua) and scientists. Parties who may find this process useful include formal and informal Māori organisations, such as iwi and its mandated representatives; and the research providers who want to engage with Māori about a specific research proposal(s). In this respect, the process is quite general so could be adopted by researchers working in Crown Research Institutes, universities, government departments, or even private companies.
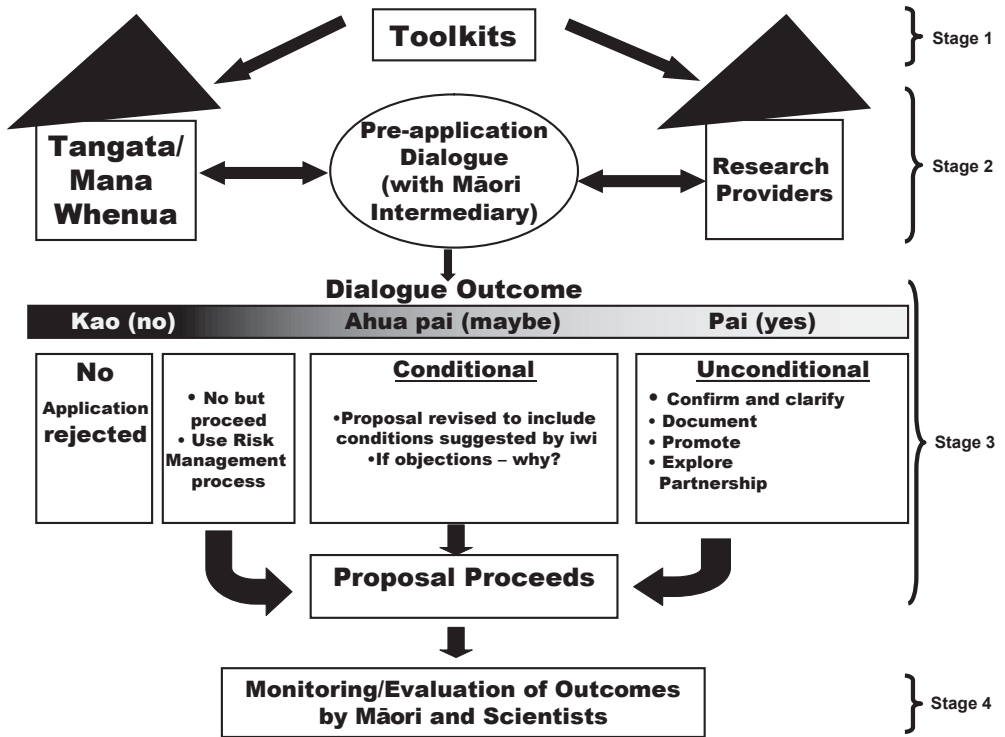
Fig. 1   The Te Aroturuki framework process for cross-cultural dialogue.

The process is a deliberate and staged approach, consisting of four distinct components (Fig. 1). Stage One outlines the exchange and utilisation of "toolkits" to enhance understanding *before* the two parties engage in dialogue. The information in the toolkits is aimed at increasing each party's level of understanding so that different perspectives can be incorporated into the specific research proposals. Stage Two describes the dialogue phase and provides guidelines for "best practice" to enable both parties to engage in the interaction in an atmosphere of mutual respect. Stage Three allows for a spectrum of possible responses following dialogue around the research proposal, and identifies alternative outcomes from the each of potential responses. The fourth and final stage of the process outlines the monitoring and evaluation process. Finally, we introduce the notion of utilising a Māori intermediary (MI) to enhance the process's effectiveness.

Stage One: Assessment of need and exchange of toolkits

The first step is to determine if this process is needed. It has been developed specifically for engagement relating to those technologies that are potentially controversial to Māori because the technologies (a) may be inconsistent with at least some Māori values (for example, genetic modification), and/or (b) have negative impacts on Māori arising from the technology implementation. These include technologies that could directly or indirectly impact whanau ora (human health); whakapapa (ancestral relationships); taonga (valued items) such as wahi tapu (sacred places), awa (waterways), moana (seas and lakes); taiao (environment); and/or technologies that impact the ability of Māori communities to exercise kaitiakitanga (guardianship) or rangatiriatanga (control) over their spiritual and physical resources. In instances where

researchers are uncertain whether or not a specific technology may be controversial, opinions can be solicited from (a) local Māori communities, (b) Whare Wānanga and universities, and (c) Māori employees in moderate to large New Zealand-based scientific research organisations such as Crown Research Institutes and universities. In addition, there are regulatory requirements to consult with Māori. For example, ERMA, the statutory authority responsible for implementing the HSNO Act (1996) requires applicants to take into account Māori considerations as defined under sections 6(d) and 8 of this Act (ERMA 2004). The aforementioned agencies will also be able to advise which whanui/hapu/iwi should be consulted with.

If a technology is deemed to be potentially controversial to Māori, then the parties move into the first stage of the process itself. This stage is for each party to learn about the other, by utilising toolkits that include information about the other party. The "Raukawa-Mihingare" model, also known as the "Partnership-2 Cultures Development Model" (Royal 2002) was seen as the best way to philosophically encapsulate the "two houses" in this process (Stage 1; Fig. 1) by acknowledging and representing the autonomous development of each party's world view, authority and mana. This model requires that "each partner sees the other as a peer and embraces the ideal of assisting each other in mutual enterprises" (Royal 2002, p. 7). Furthermore, it views each party with different but equally valid world views, and that mutual respect of each others' world views are a necessity.

There are separate toolkits for Māori and scientists. Each is made up of background information (Table 2; Part 1) and a set of questions designed to challenge thinking (Table 2; Part 2). The background information in the toolkit for scientists includes a summary of key literature describing cross-cultural dialogue, a generic set of descriptors of Māori values and a glossary of Māori words that may be useful (Table 2). The purpose of reading the background information is for scientists to gain a basic understanding of Te Ao Māori (the Māori world), and at least some of the concepts underpinning core Māori values and culture. The background reading should be undertaken while the research proposal is being written.

The background information in the toolkit for Māori is similar but also contains the basic principles of Western science and an outline of the ethical framework in which scientists operate. Other information includes a glossary of scientific terms and acronyms that might be used; an overview of the process (Fig. 1), and information about the scientists and their respective organisation(s) including their organisational kawa (protocols).

Table 1 Overview of toolbox components and process prior to engagement with hapu/iwi.

Stage	Toolbox for scientists	Toolbox for Māori
Part 1: background information	Summary of key literature on Māori views of science Generic set of Māori values Glossary of Māori words Outline of consulation process Diagram and description of the process Information about the hapu/iwi	Glossary of scientific terms and acronyms Outline of relevant legislation that impact consulation processes Diagram and description of the process Descriptions of underpinning scientific method and philosophies Information about about the organisation and scientist(s) including protocols
Part 2: questions (together with Māori intermediary)	Questions about research proposal Generic questions "Trigger" questions Modify proposal if necessary to accommodate responses	The research proposal Collectively agree on questions to ask scientists about research proposal Identify the key issues Are there outcomes and benefits for Māori?

The second part of the toolkits is for each party to answer a set of questions similar to those that are likely to be posed by the other party during the consultation process. These are not intended as prescriptive questions, but are examples that others have used in evaluating other research proposals that have an impact on Māori. During this second step, both Māori and the scientist(s) would be assisted by a sufficiently knowledgeable Māori intermediary(ies) (MI)—whose role(s) it will be to assist each party through this process, and work with each in an interactive manner prior to, as well as during interactions with hapu/iwi.

Part 2 of the scientists' toolkit contains generic questions and relates to the background and general aspects of the research. Publications such as Cram et al. (2002), Harmsworth (2005), and Roberts & Fairweather (2004) were used to define some of the key questions. Many of the answers to these questions should be accessible in the research proposal itself (for example, the scope of the research) while others require the scientist to think more laterally about their proposal (e.g., What are the benefits to Māori? What alternative research could lead to the same outcomes?). Other questions will be more thought-provoking and relate to impacts on some of the core Māori values (as described previously by Durie 2004) with respect to (i) the natural environment (te taha taiao: kaitiakitanga, mauri, whanaungatanga), (ii) the human condition (te taha tangata: whakapapa, tapu, mana, wairua, oranga), and (iii) procedural confidence

Table 2 Description of potential outcomes, benefits and opportunity costs associated with a spectrum of various decisions.

Decision	Possible outcome	Benefits	Possible opportunity cost
Application not supported by Māori	Application stopped by research provider	Knowledge from process, relationship building, trust Clearer understanding of spectrum and weighting of opinions	Research outputs; scientific knowledge; loss of science credibility; reputation; future opportunities Possible loss of revenue
Application not supported by Māori	Research provider chooses to proceed with the application although it is not supported by Māori	Knowledge from process applied to next set of research proposals Clearer understanding of spectrum and weighting of opinions	Impaired relationship status with Māori; fewer opportunities with Māori; loss of credibility in Māori world, (including media fall out); less likelihood of approvals
Application partly supported by Māori (conditional)	Application is modified to include Māori suggestions where applicable	Increased involvement of Māori, a clarified proposal, trust, enhanced stakeholder relationships, leverage into relationships with other possible Māori entities	Possible research outcomes, retention of traditional values Support by some Māori and/or scientists
Application fully supported	Application is approved with view to creating benefits	Joint venture or partnership, media exposure	Possibility of internal divisions amongst Māori if the decision does not have wider popular support. Negative impact on Mana Whenua if the decision is not widely supported

(te taha tikanga). Durie's (2004) model is based on a "paradigm of potential", motivated by the fundamental belief that Māori values provide a basis for assessing the relevance and potential benefits from the research, rather than being restricted to risk aversion. The "trigger" questions are therefore designed to ensure that the research is comprehensively evaluated from a Māori perspective to ensure potential benefits as well as risks are identified. We also caution scientists that there is usually not a single Māori "view" on any one issue, and as such views may differ to some extent among and within different whanau, hapu and iwi.

As a result of the scientist (assisted by the MI) answering the questions and prior to commencing dialogue with hapu/iwi, researchers may need to modify their proposal(s) to further refine it, to increase the likelihood of mutually beneficial outcomes (Table 2; Part 2). It is at this point that a draft of the research proposal is given to Māori for their consideration. For Māori, Part 2 involves reading the draft research proposal and collectively deciding the key questions to ask scientists, as well as identifying any issues or concerns that they might have with the proposal.

Stage Two: Proposal dialogue

This phase of the process is where the proposed research is formally presented to Māori on behalf of the research provider. The choice of venue and time allowed for the interaction is important. For example, there may be a powhiri (welcoming ceremony), conducted in the Māori language that could accompany such an interaction—particularly if the meeting was to be held in a place of ceremony. This will help reflect the mutual respect each party has for each other as well as the tone for the interaction. If scientists are unfamiliar with Māori welcoming ceremonies, the MI can help explain the meaning behind the words, gestures and order of events so the scientist as least knows what is expected of him/her.

During the dialogue itself, it is appropriate for the MI to facilitate the discussion, subject to mandate from tangata whenua. It is expected both parties will openly share information that contributes to the process of reaching a decision. Although the toolkit incorporates a generic set of Māori values that can be interpreted and applied in a wide range of situations, scientists should recognise that ultimately it is for the Māori group to define for themselves how they intend to evaluate the research proposal using whatever values (tikanga) and/or protocols (kawa) they deem important and applicable.

Scientists need to demonstrate a genuine willingness to listen, and readiness to modify research plans. Such modifications may involve provision for Māori involvement in components of the research including participation, monitoring, and reporting back research results to the wider hapu/iwi. Such willingness will improve trust between parties, and assure Māori that the dialogue is mutually beneficial rather than an information dissemination exercise.

Stage Three: Response to proposal dialogue

After the discussions in Stage Two, both parties will have made an informed decision. Depending upon the research proposal, possible responses range from complete rejection through to complete consent. Likewise, the corresponding outcomes from each of these responses will vary. In instances where a research proposal is rejected, the process also urges for a deliberate outcome evaluation and risk mitigation of the opportunity cost of going ahead with the proposal without Māori consent. In practice, a number of field trials of genetically modified plants have already been undertaken in New Zealand, despite objections by various Māori groups. Impacts of these situations need to be identified by the research organisation and monitored in a systematic manner. Alternatively, if unconditional support was given for the proposal, an outcome of this may be for Māori and scientists to enter a joint venture to cement the relationship. There is a range of other possible outcomes (Table 2).

Stage Four: Monitoring and evaluation

An important part of the process is the monitoring and evaluation of benefits to Māori. This reflects the desire for this process to be outcome focused with measureable outputs. The MI could assist with the monitoring and evaluation process by working with iwi to provide answers to the following questions:

- Did this relationship work, if so, why? (if not, why not?)
- Did the research proposal deliver proposed outcomes and benefits?
- Was there an increase in basic knowledge by each of the parties?
- What steps are needed to fill knowledge gaps?
- What other benefits and costs were incurred?

Ideally, benefits should be more than just the outcomes of the research per se. They could include unanticipated strategic benefits, social (e.g., scientists have become more comfortable with Māori values and language, improved knowledge of Western science by Māori), joint ventures, improvements in relationship status between the two parties, new opportunities for either or both arising from a relationship. The purpose of asking such questions at the evaluation stage will help to measure outputs and refine the process in future. Such a process need not be time-bound, and evaluations could be undertaken at several time points, the frequency dependent partly on the research project, and partly on hapu/iwi perspective.

Māori intermediary(ies) (MI, Kaiwhakarite)

A key component throughout this process is the utilisation of the MI (or group of MI), or "Kaiwhakarite", to assist scientists with Toolkit Stage two (including reshaping research proposals), as well as facilitating the dialogue between parties. The MI should be respected by both parties and sufficiently knowledgable in Tikanga and Te Reo Māori, and able to understand and communicate the broad scientific concepts. It may be necessary for the dialogue partners to collectively choose the MI. This means that different people could be used for different proposals, and may not necessarily involve the research providers' Māori employees. A set of required characteristics for the MI are outlined in Table 3.

While it is expected that the research provider fund the MI, the MI role is neutral in terms of the issues being discussed. This neutrality is important to guarantee the success of the dialogue, to allow for the protection of both parties' interests, and for the MI to retain his/her/their mana (status) from the perspective of the Māori partner(s) in the dialogue.

CASE STUDY

To illustrate an application of the Te Aroturuki enagagement process, we draw on current and prior experience to describe a case study on a field trial of genetically modified *Pinus radiata* D.Don.

Stage One: Assessment of need for consultation with Māori and exchange of toolkits

The lead research scientist first determined that some form of engagement was necessary because of the controversial nature of GM, and also from a meeting with representatives from ERMA. Although the MI role was not formalised, scientists utilised Scion Māori staff (e.g., Scientist, the Maori Business Development Manager, etc) to help develop a communication strategy. This included a written document describing the proposed trial in non-technical terms as well as a discussion of some of the generic and trigger questions likely to be most important to the hapu. Examples included describing the source of genes, likely impacts on whakapapa, steps to mitigate impacts and how benefits to the hapu could be realised. Several Te Aroturuki members also provided assistance by providing background reference material for scientists (including relevant literature on Māori perspectives of science and concerns about

genetic modification), and formulating both generic and trigger questions. Maori employees of the research organisation also provided background for Mana Whenua (MW) representatives regarding the organisation itself. This was the functional equivalent of toolkit exchange.

Stage Two: Proposal dialogue

The dialogue phase included several meetings where at least one rangatira (Chief leader) accompanied by several pākeke (adults) met with research scientists and senior managers at the research organisation. Following whakatau, mihi (exhange of greetings) and karakia whakatimata (opening prayers), the field trial was described in general terms, followed by discussion using an open question-and-answer format. Specific concerns were raised by each party and addressed. Reasons for support of a previous field trial by MW were also discussed. At the end of each meeting, minutes were prepared and circulated to all participants to ensure all issues were recorded appropriately. Two meetings were necessary to cover all concerns, and to negotiate modifications to the original proposal.

Stage Three: Response to proposal dialogue

MW representatives gave a conditional "yes" to the proposal subject to: (1) allowance for tohunga to recite karakia at the site itself to "bless" the site prior to planting trees; (2) more immediate benefits arising from the field trial including employment of hapu members for aspects of the field trial, in research programmes; (3) the research provider considering and proposing ways to acknowledge support of MW by supporting hapu development initiatives such as assisting with hapu vocational development programmes, and (4) incorporating formal monitoring of the trial including access to results, and meetings between science staff and a mandated hapu representative. MW representatives also agreed to assist with writing sections pertaining to Māori in the ERMA application, by stating their specific concerns as well as expected benefits, and their position regarding the proposal. The two parties also agreed to document the conditions and agreed responses in a Memorandum of Understanding.

Stage Four: Monitoring and evaluation

This stage (for the previous field trial and expected to be similar for the current field trial) in-cluded: (1) ongoing monitoring of the field trial by a mandated MW representative in quarterly meetings with the lead scientist to review the most recent scientific results on environmental

Table 3 Preferred characteristics of the Māori intermediary(ies).

Characteristic	Function
Ability to understand and teach Māori values (tikanga) and protocols (kawa)	Enhance scientists in dealing with cultural situations Assist scientists to answer questions triggered by the toolkit
Ability to understand and relay basic scientific information and methodology	Assist iwi in the interpretation of scientific process and data
Have respect in both the scientific and Māori community	To be acceptable and feel comfortable working with both parties
Understand the funding requirements for scientists, and associated application processes	Assistance in communicating the research proposal for a wider public forum including Māori Assist in the reshaping of a proposal to take into account any issues after interaction with Māori organisations

impacts research undertaken by collaborators; (2) production and circulation of a booklet written by and for Māori communicating the intent and early results from the field trial, accompanied by hui to present the booklet and discuss the field trial with the wider hapu; (3) at the cessation of the field trial, discussions between senior science managers, rangatira and other mandated hapu representatives identifying outcomes from the field trial for each of the parties as well as other potentially impacted parties such as Māori forestry interests beyond those specific to the hapu.

DISCUSSION

Development of this process was originally motivated by our view that there has been a lack of effective processes to ensure that Māori perspectives are incorporated into GM research programmes in a manner that ensured positive outcomes for Māori. This process was designed to be applied at the proposal development stage, and to incorporate Māori perspectives well prior to lodging applications with ERMA or funding agencies. Such a process is, in our view, necessary given the importance of Māori contribution to New Zealand society and its economy. Furthermore, demographic projections predicting continued Māori population growth over the next 20 years indicate Māori will continue to become significant players in the social, economic, and cultural development of New Zealand. For example, Māori ownership of New Zealand plantation forest lands has been forecast to increase to 40% of total New Zealand plantation estate (C. S. Insley pers. comm.).

Scientists need to be cognisant that communities, irrespective of ethnicity, are primarily concerned with application and outcomes from the science, rather than the science itself. In preparing for dialogue, scientists need to be aware of the diversity of opinion within Māori communities. Such opinions may include: (1) an economic development impetus—usually associated with commercial opportunities and initiatives; (2) a need for scientists to demonstrate tangible recognition of the Māori world view, for example, mana and status of local hapu/iwi as MW, and of Mātauranga Māori as an equally valid knowledge system to (non-Māori) science-derived knowledge; (3) recognition of the Treaty of Waitangi and how its underpinning principles are incorporated in the research proposal itself; and (4) a strong desire for social justice and cultural restitution. Māori communities inevitably need to balance this range of opinions, thus in working with Māori, proposals will need to address this suite of opinions, and be sufficiently flexible to accommodate the more heavily weighted opinions. MIs are important to assisting in this process, particularly as they should have prior knowledge of the range and balance of opinions likely to be held within and/or among iwi and hapu.

Similarly, Māori will benefit from a wider understanding of both the underpinning values and the complexities of contemporary science praxis in New Zealand. Scientific research is undertaken in a manner where subjectivity—including that arising from application of human values—is minimised to ensure objective data generation and interpretation. Concerns may arise when societies overlay their values on the research, particularly when possible applications conflict with societal values. Thus scientific research can sometimes be reinterpreted by the wider community as being immoral rather than amoral. Furthermore, diversity occurs within science "communities" also: most moderate to large science institutions often have science managers whose training may be in areas other than science, and are likely to be involved in interactions with Māori. Imperatives of such managers may differ to those of the scientists themselves—the latter concerned with the pursuit of knowledge and its application, while the former may be concerned more with organisational goals. The toolkit for Māori describes the above, so that Māori will enter into dialogue with a better contextual understanding of both scientists and the organisations they work for.

The process provides a framework for capturing future opportunities for research providers. While it may seem onerous to scientists to have to take the time to inform themselves about another culture, Te Aroturuki's view is that there is no substitute for informed dialogue. For scientists and their managers wishing to work with Māori on a frequent basis, being informed of Māori perspectives should be perpetually beneficial (e.g., Harmsworth et al. 2002; Cram et al. 2002; Harmsworth 2005). In the future, we envision scientists confidently engaging with Māori and drawing inspiration and fulfilment from delivering science-derived benefits to diverse communities. Furthermore, scientists will not be deterred by cultural barriers, but will take the time to listen to, learn from and connect with tangata whenua. Similarly, science organisations of the future will be those that have established robust, time-tested relationships with Māori based on mutual respect and reciprocal beneficial agreements, projects and initiatives. Within these organisations, dialogue with Māori around controversial technologies will have developed to the point where engagement and involvement is operationally routine.

For Māori, the process still respects the need to allow hapu/iwi the time to ask questions and raise concerns, with due care that enough time is allowed for thorough airing of the issues. There are also potential strategic benefits, for example, direct joint venture partnerships. Additional benefits include upskilling of Māori in science which will increase the knowledge base of hapu and iwi. In addition, it may promote science to Māori as a career option in an area where Māori are substantively under-represented (McKinley et al. 2004). Another important potential outcome for Māori includes aversion of previous negative experiences of working with scientists where communication has been one-way, and consultation processes had predetermined outcomes (e.g., Cram et al. 2002; Cronin & Jackson 2004). Such processes have eroded trust amongst some Māori (Laws 2002; Cronin & Jackson 2004). Reasons for such mistrust include the undermining of indigenous status, plagiarism of indigenous knowledge by Western researchers and a limited methodology which only allows for limited outcomes (Durie 2004).

Although this process has been developed specifically for controversial technologies, it could be adapted for other purposes. For example, it could be used by non-Māori businesses considering implementing technologies which may impact Māori communities. Parts of the process could also be adapted to incorporate perspectives of other strategically important groups whose world views differ from the majority. Furthermore, parts of the process could be used for non-controversial research that is of interest to Māori. However, the process' applicability in these instances may be limited by the time in which it takes to implement. For non-controversial technologies, this process may be unnecessary, particularly for formal relationships of a more routine nature (for example, joint ventures or transactional fee-for-service relationships). Nonetheless, some of the information in the toolkits may be useful to either party.

The process does not supplant need for a positive relationship between research providers and MW hapu. For Māori, the nature of this relationship reflects research providers' commitment to the acknowledgement of Māori values by recognising the importance of MW status. Postive outcomes from the process for other hapu and iwi are more likely if this relationship is strong.

FUTURE WORK

Te Aroturuki and the Scion scientists (PLW, JAC) are collaborating with the Kaupapa Kura Taiao Unit of the ERMA NZ to complete the toolkits as separate publications for Māori and scientists. As part of this process, the questions in the toolkit (Part 2) will be tested using further case studies. Web-based toolkits are currently under development and will be acces-

sible to Māori and New Zealand science communities. Te Aroturuki and Scion also plans to implement the process across the rest of the organisation.

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