

Kotahi Rau Tau | 2019 Academy Centenary Academy Centennial Symposium: Inclusive excellence

Royal Society Te Apārangī, Aronui Lecture Theatre | Thorndon Wellington
Rāmere Friday 15 Hui Tanguru February

Overall Insights – Executive Summary

Indigenous research

- Indigenous researchers seek evaluation of their work in the context in which it is conducted, without requiring re-interpretation into another paradigm for evaluation of excellence.
- Indigenous research seeks to meet the needs of communities – those communities demand involvement in setting the research question, co-design of the research approach and participation throughout execution of the research.
- Communities want researchers to make a positive impact on their lives so they have no tolerance for research that is a personal interest.
- Communities coming back to researchers to ask them to keep helping them to solve problems should be an important measure of success for the researchers; “real world impact”.
- The ecosystem is very important in indigenous research, and has moved from a focus on individual research heroes towards teams, team leaders and collaborations.
- The excellence and/or impact of work within indigenous communities is not captured in common metrics like h-indices or in the Performance-Based Research Fund.
- Excellence occurs when a community of scholars share each other’s visions and work, support emerging researchers and go the extra mile to make sure that all will flourish.
- Māori research has an integrity of its own.

Interdisciplinary research

- Interdisciplinary research (IR) often seems to solve real world problems through building short-term collaborations, meaning that building a career in IR is difficult.
- Researchers who succeed in IR are very open to new ideas, able to relate across a range of disciplines, tolerate ambiguity, have a willingness to learn and communicate well.
- The overall impact of IR is possible to demonstrate via a case study approach but developing generic metrics that apply across a range of IR projects would be very difficult.
- The nature of IR is that the interactions and collaborations of themselves create an output that is greater than the sum of the parts, but attribution to individuals is fraught.
- Research funders need to take different approaches to assessing IR proposals from those used for other research, and similarly research organisations need to have policies conducive to IR programmes.
- Discipline-based reviewers often find IR research to be less stretchy or deep in discipline-specific fields, thus defining IR as something that creates new knowledge but doesn’t have “enough” of any one discipline to satisfy the discipline-specific. As a result, it can suffer in paper reviews, grant applications reviews, and other areas when subjected to discipline-specific review or assessment

Impact and advancement

- Impacts of research can be positive or negative, sometimes both, sometimes intended, sometimes unintended, sometimes immediate, and sometimes taking decades to emerge.
- Impact needs to be viewed broadly – including economic, social, environmental and cultural. Disruptive impacts can change the whole fabric of the way of thinking or acting in a community, and are harder to anticipate when establishing metrics for impact.
- The value (positive or negative) ascribed to research findings by those who are motivated to use those findings is a useful means of measurement, and in some circumstances the extent of investment is a helpful proxy.
- Researchers will target whatever proxies are established, but often these will be proxies on the pathway to impact rather than measuring the actual longer-term real impact.
- Excellence and impact cannot be evaluated in absolute terms but rather measurement needs to be contextualised, for example, taking into account the requirements of the research funder.

Research that informs clinical and professional practice

- Different models exist in different domains for uptake by the relevant professionals or clinicians and so no one model fits all. However, practitioners require sufficient proof of validity of findings before uptake will occur.
- In the clinical area, there must be demonstration that the research is excellent scientifically such as via peer review, whereas in engineering review by practitioners and via Standards processes is the normal peer review process, and uptake in codes and Standards is a proxy for excellence.
- Changing the practice of a professional or clinical community based on robust research is meritorious advancement or impact, and should be given due recognition.

Opening remarks

Royal Society Te Apārangi Kaumātua **Peter Jackson**, Te Ātiawa opened with a mihi and karakia followed by opening remarks by the Chair of the Academy Executive Committee, **Professor Richard Blaikie** FRSNZ.

Richard pointed out there is a language of excellence and impact already in New Zealand, for example in the National Statement of Science Investment and in some criteria used by the Performance-Based Research Fund. The Society had the opportunity to delve further into evaluating excellence as its Act allowed for recognition of both distinction in research and advancement of science, technology and the humanities. The use of bibliometric data had been growing but the issues around interpretation of such data were now also being well-aired. In some fields such metrics did not exist. Further, the Society wishes to embrace high quality intellectual endeavour leading to new knowledge across a wide range of contexts, wherever and however it might occur – in universities, Crown Research Institutes, independent research organisations, government agencies and the private sector.

To be relevant across all such endeavour the ways in which excellence is understood need to be broad, and inclusive of the huge range of research, scholarly and innovative activity in Aotearoa New Zealand. This symposium, if successful, would lead to new insights and new shared understandings.

Indigenous research

Keynote address:

Professor Linda Tuhawai Smith FRSNZ

University of Waikato

Panel chair:

Professor Angus Macfarlane FRSNZ

University of Canterbury

Panellists:

Associate Professor Melinda Webber MRSNZ

University of Auckland

Professor Rawinia Higgins

Victoria University of Wellington

Professor Poia Rewi

University of Otago

Professor Meihana Durie

Massey University

Professor Cindy Kiro

University of Auckland

Linda Smith, professor of indigenous education at the University of Waikato, started by talking about radical hope and what Māori did in the face of complete cultural devastation. Māori chose to live and maintain their culture. Māori research is about living, creating, being, imagining, reclaiming and not being defined by their colonial experiences. It is a story of disruption academically. Originally Māori studies was about “studying Māori” and was embedded in anthropology.

Indigenous research is still being created as a field. The word “indigenous” emerged in the last 30 years post World War II in a struggle for self-determination and the rights of the indigenous peoples. Language is critical in indigenous research. It is the story of the recovery and finding a language that could give Māori self-determination.

In New Zealand Māori started without a system and had to purposely build systems of mentoring and leadership, and create journals.

Indigenous research was described originally as traditional knowledge as if when Cook arrived “we stopped knowing”. But indigenous knowledge can still be pursued and created. Māori were quick to take up knowledge and there was a time when Māori were more literate than non-Māori in New Zealand, as the missionaries quickly translated the bible into te reo Māori. “We were adaptive; we were quick to read that we needed a different kind of future.”

A system of excellence that sucks out the joy of researchers cannot be conducive to excellence. The ecosystem is very important for excellent indigenous research. What does it take to produce an excellent researcher in this context? Originally excellence was identifiable as hero leadership, but now it is about teams, collaborators, and research leaders. Excellence arises in a community of scholars who share each other’s visions and work, support emerging researchers and go the extra mile to make sure that they all flourish.

Communities want researchers to make a positive impact on their lives so they have no tolerance for research that is a personal interest. They want to know how it connects and the difference it will make now and for the next generation. That is the hardest measure of impact.

Rawinia Higgins is Deputy Vice-Chancellor Māori at Victoria University of Wellington. She emphasised that we consider an ecosystem that pushes back and creates a counter narrative to how others have described or “discovered” Māori as being important.

Māori researchers are measured by the expectations and accountabilities put on them by their people to make a difference. That is a hard measure. There is a Whakatauki that reminds Māori of these things “It is through your hard work that you will gain the recognition of your people and your world”.

Māori research doesn't always fit within h-indices. We should consider creating other indices, for example -- Maui-index = to push the boundaries OR an i-index = an indigenous index. “When your people keep coming back to you to undertake more research, then you know your research is useful and that you are having impact. The call up from others is important.”

Rawina put out a wero (challenge) to Pakeha researchers with respect to inclusive excellence: “How can you include us when you are still trying to understand us? We know how to play the academic game and we have proven ourselves using your convention. We have shared with you all today all the other things that we have to do...so how are you going to include us in your inclusive excellence...when you are still trying to understand us and your disciplines have tried to erase us?”

Melinda Webber works in the Faculty of Education and Social Work at the University of Auckland. She identified with First Nation's scholar Shawn Wilson's (2008) description and explanation of indigenous “research as ceremony” (e.g., Indigenous research is the ceremony of maintaining accountability to relationships, and co-constructing what would be good for the community *with* the community).

Māori come from a long lineage of research excellence. Excellence is about the production of useful knowledge that is relevant, authoritative and accessible. Māori don't go in with a set research design when they go into communities, but it is about co-construction and co-creation. Indigenous research needs to be grounded in aroha and led by indigenous researchers who are cognisant of tikanga and Maori worldview. Ian Taylor, 2019 New Zealand Innovator of the Year, said that “when the innovative nature of mātauranga Māori is embraced by all we will be our best New Zealand selves”.

Meihana Durie is Head of the School of Te Pūtahi-a-Toi, Massey University and is Professor of Māori Knowledge. In his view, Māori research offers a platform upon which to reverse the impacts of subjugation of colonial knowledge. He also emphasises the point that Māori knowledge is not static, but continually evolving. Māori research therefore ought to take cognisance of a wider more holistic set of considerations. For example, mauri (lifeforce) is important. Māori research can contribute to the enhancement of mauri, both within the context of people and the environment.

Moreover, Māori researchers carry an obligation to the mana of their ancestor, their people and communities. This responsibility is embedded within Māori guiding principles, or, kaupapa, such as whakapapa, whanaungatanga and kaitiakitanga. In seeking to measure or define Māori research excellence, these critical elements are too often overlooked or dismissed.

Māori research, increasingly, will need to prioritise whānau and hapū dynamics, alongside iwi aspirations. Māori research excellence in this respect, can also be measured in terms of transformative potential.

Māori research in the near future might ideally explore new pathways in which a new curriculum can emerge that enables pūmanawa (talent and potential) to be revealed whilst identifying the appropriate tools that empower whānau to promote and nourish pūmanawa.

Poia Rewi is a professor and the head of Te Tumu: School of Maori, Pacific, and Indigenous Studies at the University of Otago. Poia mentioned that research is significant to the small and large. Researchers need to respect and acknowledge communities for their intelligence and speak in the language of those communities. Communities must experience excellence as they see, hear, and feel it. Māori have small family projects in little hapū which academics don't always acknowledge as significant research engagement.

Indigenous publications should be viewed as international publications. We need to get equity in the measurement of excellence. Poia said he struggles with the term "excellence" as he says when asked, Māori whānau will humbly say something is good or not good as opposed to responding that one's work is 'excellent'.

Cindy Kiro is Pro Vice-Chancellor Māori at the University of Auckland. She emphasised that aroha and compassion are important in doing research. The obligation is to use the best of our skills, knowledge and values to drive the work we do with communities.

You can not be Māori without wairua (connectedness). There is a wero (challenge) to other Māori researchers on how they improve the lives of Māori outside of 'traditional' communities, i.e. urban Māori.

Angus Macfarlane is Professor of Māori Research at the University of Canterbury. He stated that new settlers attempted to knock the epistemological base from Māori knowledge by dismissing it as inferior. The core of mātauranga Māori, however, resides in historical and ancestral influences and these influences ensured its durability. While research (rangahau) is important and has the potential to take Māori to the world, research begins with the aspirations of local communities.

Discussion: It was raised how to increase Māori investment in Māori research? The panel acknowledged it was already happening, but not always through money – supplying time and kai were often what was affordable, and would be generously given if the relationships were authentic.

The term 'inclusive excellence' was challenged – is it enough to broaden the playing field when perhaps the playing field needs to be deconstructed? Tokenism is to be avoided and instead focus on pūmanawa (talents).

There are sound reasons that iwi are sceptical of research and researchers. The role and actions of iwi are changing as the Māori economy post-settlement is now increasingly driven by land trusts etc. and not necessarily by iwi. Iwi often finds Government co-funding rules lack flexibility.

It was acknowledged that several decades ago everything in the academic world was a roadblock for Māori research, but through a supportive group of peers it had been possible to build the systems,

such as the journals, to establish the discipline of indigenous research. An example of an academic department wanting to increase diversity but then thinking too narrowly (they wanted a Māori researcher with a PhD in “16th Century Literature”) was cited. This was an example of maintaining the status quo and the same research expertise that the department had offered in the past, whereas a new academic appointment is a chance to broaden the disciplines that the department offers or develop new disciplines.

Impact and advancement

Keynote address:

Dr Hugh Bradlow FTSE

President of ATSE

Panel Chair:

Dr Prue Williams

MBIE

Panellists:

Professor Merryn Tawhai FRSNZ

University of Auckland

Dr Gradon Diprose

Manaaki Whenua (Landcare Research)

Professor Paul Spoonley FRSNZ

Massey University

Hugh Bradlow explained innovation as having three necessary components – novelty, difficulty and real world impact (Does it influence real people? Who is going to care? Is there someone who will actually follow the project for its possible success?). Impactful research came from researchers tackling important rather than interesting problems, and this approach also aided the transfer of researchers to private sector roles. Something like 80-90% of research is not replicated indicating that such research is irrelevant to potential users. To get impact some sort of research translation process has to occur. Industry tends to view issues as top-down by prioritising importance, whereas researchers have historically focussed on the most interesting problems. Academics may not be aware that industry wants the minimum viable solution in most cases.

Historically, research excellence was hypothesis-driven where data were used to test the hypothesis, whereas now increasingly there was a shift from such model-driven to data-driven research. For example, speech recognition was traditionally based on mathematical models but has moved to be data-driven using the massive increases in computational power, and the level of accuracy has vastly increased.

In general commercial success requires more technology uptake. In the sectors he was familiar with 90% of firms now recognise that they need mathematical capability. Adopting new technology is extremely difficult without the skills to do it, yet most academics have not worked in industry and so may not be able to prepare or even expose postgraduate students to what is done in industry.

The Australian Academy of Technology and Engineering has examined potential metrics for the value of research and has come to a single most effective metric – the extent to which the private sector is prepared to put some real money into picking up and using the research. The greater the investment, the greater the perceived value. Other proxies like patents were inferior in their experience.

Hugh also commented on the three big things the Academy of Technology and Engineering is involved in as an academy: diversity and inclusion; digital readiness (there is a perception that Australian businesses are remarkably ill-prepared for what will hit in 10 years, e.g., electric and autonomous transport); and STEM education which needs to be improved, e.g., revision of teaching qualifications; adoption of technology; and Internet resource adoption.

Gradon Diprose is a human geographer who recently moved from a university to a Crown Research Institute. He identified broad changes in human geography away from leadership being vested with

men from the developed world who wrote from a Euro-centric perspective towards greater recognition of female and indigenous researchers. In New Zealand this was expanding the boundaries of what was considered geography. It was often participatory and whilst academic publications are still relevant there is a need for outreach. Researchers need to go beyond critique of data towards considering the likely effect of their work, engagement and participatory research.

Merryn Tawhai is a bioengineer, working in a multidisciplinary area, developing technology in a clinical context. She commented that because of the subject matter of her field it was easy to convince people that her research has impact. It was still important to acknowledge the basic science impact – some early published work is highly cited, but additionally there have been a lot of applications of that work. Her bioengineering colleagues often develop niche devices to solve an in-house problem, but some of these have become the basis for commercial products through spin-out commercialisation. Impact is thus not always predictable. If metrics for impact are put in place then researchers will develop means to hit them, but it is important that the unpredictable impacts that lie outside such metrics still occur and are recognised.

Paul Spoonley is a social scientist at Massey University. In the 1990s what we valued was different. You could do world class social research in New Zealand, but many of the metrics we were using did not evaluate impact. For social research to have impact, partnership is really fundamental, with the community, but not necessarily with business. A key success factor is properly defining the problem, with community input, before seeking funding. Consequently, there is a shift in client groups for much research. There is a duty to communicate research findings to those communities for whom it is relevant and to engage in public debate. Social researchers are knowledge brokers who co-create knowledge and increasingly need to think about public policy impact. Present challenges include the extent to which our research funding system needs to embrace non-western knowledge systems.

Discussion: Prue Williams emphasised that the Government is particularly interested in investing in excellence, but it needs to be ‘fit for purpose’ excellence. The other Government focus is impact, recognising that impact can come on different time scales depending on the nature of the research and the pathway to impact. Impact was much broader than economic benefits.

It was questioned whether a system can realistically value disparate areas of application, e.g., in theoretical physics versus in dairy industry practice? Hugh Bradlow commented that the Australian experience was that evaluation needed to look at where the research is leading to, and who is prepared to pay for the outcome. Blue skies research is still important, but programmes without realistic pathways to impact have been scrapped.

The panel were asked to comment on how to evaluate research that is seeking to be disruptive of the widely accepted norms. The impact might take decades. There is a big difference between the perception and reality of impact, and the design of proxies for impact is thus critical. Most of what is measured in shortish time scales are only steps on the pathway to having impact. In seeking impact we need to recognise that fundamental research can be highly disruptive in ways not predictable in advance. Some researchers are bad at explaining the impact and some really amazing research is being done by people who do not target bringing about immediate impacts. As a nation we are relatively poor at measuring the translation, what we need to do, in practice.

Examples were related of scientific discoveries (e.g., chlorofluorocarbons, leaded petrol) that appeared initially to have wide benefits yet were discovered years later to have serious negative

environmental impacts. It is important that both positive and negative impacts are considered, and cultural impact is not forgotten – a technology can be disruptive in ways not easily predictable. Artificial intelligence was cited as an example – there are important studies about the impacts of such technology advances, and these throw up ethical and cultural questions which have to be thought through. Not all impacts are easily predictable. Impact measurement is hard, but it has to be undertaken so that both positive benefits and negative consequences are understood. It is not possible to ignore the potential negative impacts, but researchers should not hold back the quest for knowledge in case there might be negative impacts.

Identifying potential impacts where there is co-definition or co-creation of research is important. It is vital to go beyond tokenism. If the potential impact is wide, is it possible to go to the public at some point to ask them whether or which project should proceed? Whilst co-creation is important there are a whole lot of hidden costs so funding specifically for co-creation projects might be considered. The co-creation aspect could take longer than the research itself, and can be fraught and tough. Nevertheless, consideration of impacts is a vital element of co-creation.

It was questioned whether the different context of Crown Research Institutes led to a need to consider advancement and impact differently. CRI researchers focus on value for New Zealand, and are less likely to chase publication metrics. In their context, for a measure of excellence to be viable it must be relevant and transparent. It can include publishing where appropriate, but needs to accommodate the different types of research contract conditions. If the research is intending to change an industry practice or disrupt an existing industry then there is a need to recognise when there is success against this sort of aim.

The trends towards open research which acknowledges that all the good ideas do not originate internally is also important. Whatever metrics are used there needs to be an acknowledgement of multiple and complex pathways by which the new contribution comes about and has impact.

Examples were raised where pursuit of key performance indicators could be at the expense of the team providing the service. If a metric has negative impacts for researchers individually or does not recognise the benefits of teams, then the multiplying effect of collaboration can be lost. The contributions of researchers need to be seen as more than the sum of their outputs, but also include the intangible contributions to health of the research team. Highly competitive funding systems can end up having negative impacts on such intangibles. There is a need to ensure there is funding that supports research organisations remaining healthy. CRI core funding, although small, was an example.

Refuting bogus claims in the public arena was raised as another way that researchers can have impact. If researchers chose or were expected to step up it is important that such contributions are acknowledged. Where corporate interest might be overriding public interest, should researchers be recognised as being impactful if they step up to raise concerns?

Interdisciplinary research

Keynote address:

Professor Dame Anne Glover DBE, FRS, FRSE President, Royal Society of Edinburgh

Panel chair:

Dr Keith McLea ESR

Panellists:

Professor Geoff Chase FRSNZ	University of Canterbury
Professor Sally Davenport	Victoria University of Wellington
Dr Caroline Orchiston	University of Otago
Professor Paul Millar	University of Canterbury

Dame Anne Glover set out that the nature of research within a discipline is to build the knowledge base within that discipline and over time long-term collaborations are built and retained. New and often more specialised disciplines do emerge as groups of researchers form common interests and generate a body of knowledge that has some coherency. A risk is that one's thinking becomes constrained within the norms of the discipline. However, measurement of excellence within such a context is relatively straightforward.

In contrast, problem-oriented research focussing on real world problems needs transient interactions between the disciplines, sometimes quite short-term. Measuring what is excellent research is then a much more challenging question.

Building a career based on continuous interdisciplinary research (IR) is hard, e.g., one has a shifting peer group, it is a challenge finding high status outlets for publications, impact factors can be low, managing publication overload can be difficult, and there can be lack of institutional support for interdisciplinary research. It is risky to move beyond one's discipline, but also vital that researchers are prepared to take the risk to do so. The culture of IR is different but enabling, generating a freer approach to your own discipline.

Skills need for interdisciplinary research include:

- a level of literacy across fields of research;
- a high tolerance of ambiguity;
- a learning ethos and a willingness to learn from other disciplines;
- being open minded to rapidly accept new ideas;
- good communication skills; and
- an ability to absorb information and its implications rapidly.

IR needs managers who understand the difference to research within a discipline – being respectful of all disciplines, being proactive for the wider interest and supporting the wider group rather than being personally ambitious. IR also needs organisational structures which foster and support such programmes.

Funding can be difficult to obtain – fund requests can get passed back and forth between funding organisations or panels, and research organisations may not have mechanisms to deal with your interdisciplinary research applications.

An example of the challenges is IR on infectious diseases – the team needs to be able to deal with legal systems and systems of government, technology, economic factors, human activity and social pressures, and the influence of climate change. Microbiology might be thought initially to be the central component, but success needs all of the above.

Measuring impact of IR can be difficult as it is so multifaceted. If the IR is very problem-oriented then progress in resolving the problem might be measurable, but there is a challenge to develop generic measures that apply across a range of IR programmes. Measurement may be easier when only 'close' disciplines are involved. IR programmes can also have significant spin-off benefits. An excellent example is the hadron collider at CERN. It took historians, mathematicians, medical scientists, engineers, biologists and others to come together to make it. It gave us the world wide web and many medical advances.

Rather than try to design a generic measurement system for excellence it may be best to use case studies on how the IR has delivered impacts. Trying to get too fine-grained to discern contributions of individuals may be unwise as the outputs and impacts are the result of complex interactions across disciplines within team environments.

Sally Davenport chairs of one of the National Science Challenges and in this context she has a mandate to get people to work together differently – building new collaborations. Success comes about when people bring their own capabilities and open minds to the table to meet with new people with different knowledge sets to contribute (including industry and Māori) to think about a broad issue in a mission-led manner. This approach appears to be successful especially in increasing diversity in the teams, so they involve more emerging researchers and are increasing Māori and industry participation, as they 'stay in the room' with the researchers. This type of project is still generating research papers but having other excellent behavioural impacts as well.

Caroline Orchiston has a background as a geologist but her involvement in a National Science Challenge has broadened her work across science, commerce and humanities in work on the potential impacts of large earthquake events. The work is very mission-led, involves synthesising the contributions from a range of specialists (co-creation) and is proving successful through the additionality created by the IR approach. It is stimulating to be part of interdisciplinary research, but there are challenges such as finding a common language, confusion of where to place bids in the funding system, co-publication across the disciplines and finding the right journal. These are not insurmountable.

Paul Millar has managed to secure external funding for interdisciplinary research projects in the digital humanities. His experience was that conducting research which synthesised knowledge across the disciplines led to different types of collaboration, as well as outcomes that were broader than traditional university disciplines usually measure. At times he found it challenging to be in a college of arts in a STEM-focussed university following a natural disaster, as arts research capacities weren't always factored into recovery planning. However, he was pleased with the numerous ways in which the humanities and the social sciences responded meaningfully to post-disaster challenges. Modern arts colleges should have the capacity to become more interdisciplinary within themselves, and learn

to reach out proactively to collaborate across silos to demonstrate relevance. It is Millar's experience that interdisciplinary research can be very powerful, and that developing a big, broadly inclusive project helped get past siloed thinking and connect with other researchers.

Geoff Chase has a long history of engineering research, often working collaboratively with medicine. He had found the need to understand the medical practice to take the research further and increase the likelihood of uptake. A willingness to learn new things was vital. Interdisciplinary research is high risk, but if there is a willingness to take some risk it can redefine the way the team tackles an issue. It is important to solve urgent problems for your end user community, but also important to keep full stretch of the goals for the programme as a whole.

Discussion: The additive nature of IR was emphasised – research within a discipline can lead to a contest of ideas 'this or that' whereas IR is much more about synthesising "this and that" to create a greater outcome. Having the capacity to realise what you do not know, being able to see the possibilities, and asking others is important. When you work together and understand what each discipline can bring you have an opportunity not a difficulty.

It was questioned whether too much specialisation in the education sector was actually hindering the development of IR. Anne Glover commented that education in Scotland is very broad whereas in the rest of the UK where you become specialised at an earlier age. This was potentially an issue in New Zealand. It may be that the more we keep things open (not specialised) in our schools the greater the capability of our young people. Our artificial silos are a barrier that we need to transcend.

It was emphasised that IR presents issues for funding systems – the need for interdisciplinary panels. There is some evidence that scoring outside one's base discipline in such contexts is sufficiently accurate if the applications are suitably prepared with plain English summaries and good quality referee reports – there is no way to be an expert on everything.

The role of Māori researchers was raised – are they being included for their in-discipline knowledge, or for their wider knowledge of Mātauranga Māori, or both? It was acknowledged that in some disciplines, such as the physical sciences, there were few Māori researchers to call on to join IR teams. In such circumstances there needed to be well-planned engagement from the beginning of the IR activity. Understanding the context from the viewpoint of iwi, hapu or other Māori communities was important.

IR is better accepted in some disciplines than in others. Success was most likely if there was an open-minded approach to the potential value and contribution from each discipline. IR needs a persistent approach recognising it is not possible to please everyone.

Research that informs clinical and professional practice

Keynote address:

Distinguished Professor Jane Harding FRSNZ University of Auckland

Chair:

Professor Kath McPherson Health Research Council

Panellists:

Associate Professor Claire Charters	University of Auckland
Dr Irene Braithwaite	Medical Research Institute of New Zealand
Associate Professor Charles Clifton	University of Auckland
Dr Lisa Te Morenga	Victoria University of Wellington

Jane Harding discussed the cycle of clinical research from understanding the health problem, basic science research, development of potential treatments and tests, applied clinical research, systematic reviews, development of clinical guidelines and ultimately to effective care and establishment in clinical practice. Jane also discussed the challenges in completing this cycle and measuring excellence at each step, and specific cases where the cycle of clinical research was successfully completed.

The first case study involved the prevention of cerebral palsy. In clinical practice, it was observed that mothers given magnesium sulphate to inhibit preterm labour were less likely to have babies with cerebral palsy. Basic science was required to determine possible mechanisms by which this occurred. A large New Zealand and Australian collaborative randomised clinical trial then confirmed that this treatment was effective in practice. The results showed that magnesium sulphate treatment reduced the risk of death, cerebral palsy and the severity of the disease if present. Additional trials were required to assess the treatment effect in different contexts. Meta-analysis of all studies (almost 450,000 babies) to prove efficacy was required before practice guidelines could be developed and recommendations could be made for clinical practice. For implementation in the clinic, it was also necessary to assess the barriers to implementation, and once implemented to measure the impact of the change. The change in clinical practice was a success, as over a 3-year implementation period, it was estimated that 40 fewer babies per thousand babies born early were dying or developing cerebral palsy.

The second case study involved the prevention of stillbirth. A local questionnaire study found that pregnant women who slept on their backs or right side were more likely to have a stillborn baby. Further studies verified that mothers who slept on their backs were at increased risk of a stillbirth, but sleeping on either side proved equally safe. Additional studies showed that mothers sleeping on their backs reduced the blood supply to the unborn child, but 85% of pregnant women would be able to change the way they slept. This has led to a campaign to educate pregnant women on safe sleep positions.

Other cases involved an innovative approach to study a design for establishing the optimal oxygen levels for preterm babies, and the identification of the best time frame and conditions in which to test for congenital heart disease in newborn babies in New Zealand.

Each case highlighted the necessity of each stage of the research cycle to change clinical practice, and the role of innovation and excellence in research design and execution. She emphasised the importance of only acting on really sound reproducible science, and that rigorous peer review in leading journals and systematic review of all relevant trials were critical steps.

Although endorsement of clinical guidelines by authorities was an important success factor for uptake, there needed to be a very active implementation process to achieve large scale uptake by practitioners.

Lisa Te Morenga is an early career Māori researcher with an interest in Māori health and nutrition. The aim of her work is to reduce the health care disparities between Māori and Pacific Islanders and other New Zealanders. She also hoped to get more Māori into the sciences, and is starting to take more of a role as an advocate for Māori community groups, giving them a voice. She was involved in the preparation of the World Health Organisation (WHO) guidelines for the effects of sugars on body weight. A success factor for her had been speaking to professional organisations on her research.

Irene Braithwaite is a medical clinical researcher at Wellington Hospital. Much of her research is aimed at challenging dogma in clinical practice. She is investigating alternative ways of treating lung disease, including research aimed towards hard to reach groups including Māori and Pacifica communities. Publications are a small part of clinical research, as findings need to be translated into clinical practice and her research group seek to actively collaborate with clinicians. To perform these studies, she has developed networks with clinicians and community pharmacies. For example, using these connections, the team were able to recruit 950 participants for a cold sore study from community pharmacies. This produced a population that more accurately reflects the New Zealand community with increased inclusion of Māori and Pacifica communities.

Charles Clifton is a structural engineer who worked for 25 years in the Structural Engineering Division at the Heavy Engineering Research Association looking at the use of steel in multi-storey buildings. At the time, steel was deemed unsuitable for earthquakes and fire, and also not durable in external environments due to its tendency to rust. Concrete was considered the only suitable material for buildings and for bridges. Due to a desire to improve safety and efficiency he led research which developed new ways to use steel, demonstrating that it is an ideal material for use in earthquake risk areas, satisfactory and predictable in fires. His work quantified the rate of corrosion for various environments enabling rational design for durability of buildings and bridges.

Over 95% of the material Charles has developed has been for New Zealand practice, where it has been critically reviewed by the engineering profession and by Standards committees. Thus the peer reviewers have been more than 6,000 civil engineers and those on the specific Standards committees on which he has sat. The users of Charles' developments are putting their professional careers and company profitability on the line when they adopt new solutions, which is a much more demanding condition in his view than peer reviewing a paper for a journal. Now, significantly as a result of Charles' research, the use of steel in new commercial buildings has increased to 70% in New Zealand. These findings have gone on to influence construction practices in Canada and resulted in an international award in 2009 for a series of low damage buildings built in Wellington in 2008 which have been through two significant earthquakes since then with no damage.

Claire Charters is a law academic with expertise relevant to the Treaty of Waitangi/Te Tiriti o Waitangi. She works in the area of indigenous peoples' rights. The discipline of law is a two-way street where practice informs research and vice versa. Sometimes research is about observable changes in practice

arising from shifts in the way decisions are made. Her role started in advocacy and led into her academic career. As a Māori practitioner, there are various synergies between research and advocacy. She has worked with various iwi in New Zealand and has brought insight to the indigenous people's rights to the international forum in her work with the United Nations.

Discussion: The question of reproducibility in biomedical research was raised. It was acknowledged by the keynote speaker and relevant panellists that even with rigorous peer review, there was still the possibility that results in a sample group could differ from those in the wider community. Inevitably there is a balance between over-design of trials and cost. Ultimately, critical review and promotion of really robust excellent research on which to base practice is vital. There must be intellectual rigour.

The question of whether graduates leaving university are conversant with working at the frontiers of knowledge and with recent research findings was raised. Panellists agreed there was a need for literacy at the research/practice nexus, and the extent to which this was an issue was not consistent across the domains the panellists represented.

It was raised whether the statistical thresholds used were appropriate. The panellists suggested that there needed to be a move away from a reliance on a simple statistic towards systematic review and meta-analysis. This is the best way to avoid invalid findings. Study design and careful evaluation are important.

It was questioned whether the professional bodies such as the medical colleges assisted the process of research uptake. The panellists agreed there should be a cohesive relationship between researchers and the profession, but sometimes the learned societies were easier to work with because they did not have the regulatory focus of some professional bodies.

Closing remarks

Society President, **Professor Wendy Larner** FRSNZ closed the Symposium by first acknowledging the wonderful and generous contributions made across the four sessions, and the mahi of all who had helped ensure the day was successful.

She then emphasised the wero put down by Rawinia Higgins in the indigenous research panel; namely "how can you engage with us if you do not yet know us and understand us?" She began by observing that the overall purpose of the Symposium was to develop the understandings and relationships needed to address this wero, which was as relevant to groups such as applied researchers, interdisciplinary researchers and early career colleagues, as it was to indigenous scholars.

She had received insights in many areas – the need for aroha in building relationships, the importance of creating new research ecosystems, how to create space for new knowledges, to think more widely about the diverse ways excellence can manifest, the growth of new roles aimed at translating, communicating and realising research into impacts, the move from hero-based to team-based approaches, and how academies such as Royal Society Te Apārangi needed to change their thinking to accommodate these changes.

She concluded by saying that in hindsight the simple term “inclusive excellence” could be misconstrued – it is not about making all forms of excellence fit into one template – rather the challenge is how to embrace multiple forms of research excellence.

Closure

Professor Angus Macfarlane closed proceedings with a whakatauki and karakia.