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Trusting the scientist

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This talk is an abstract of a somewhat longer essay, which is posted today on my website. We live in what is sometimes called a post-trust society and one that is flooded with information of variable authenticity. With today's almost boundless access to news about science, claims and counterclaims can be confusing. Trust in science can be undermined by seeing too many breakthroughs debunked, too many conflicting arguments and sadly too many stories about bad science and scientific misconduct. Yet on the other hand, there has never been a more vocal public call for, and need for, active scientific expertise in addressing societal challenges, developing societal consensus and creating good public policy.

So how do we reconcile these tensions and ensure the most appropriate place for science and scientists in societal decision-making and public policy-making - both places where it has an essential role? In large part it is done by playing it straight, by being consistent and by recognising and identifying our own limits and biases as scientists. Above all, it is by recognising that public trust must be earned and actively maintained. This is not always easy to do in the competitive and skeptical culture that underpins much of science.

But the relationship between scientists and the public has changed. Over the 50 years following World War 1 publicly funded science

largely developed as a self-regulating activity. The vision described by Robert Merton in 1942 was of an autonomous culture, standing apart from the rest of society while also informing it. Today, most of us recognise that this conceptual model belongs to a different era. But it is one that not all scientists have been keen to leave.

Only late in the 20th century did we see the beginnings of any real interaction between science and society encapsulated in Giddons' 1999 description of the *social contract* between science and society. And in the last decade we have moved much further —now describing a more evolved and iterative *social compact*. Why these changes and why do they matter?

The most appreciable reason is that we are now in the age of post-normal science, where science is called upon to address the issues of acute societal interest. Such science is characterised by new methodologies, embracing uncertainties, contingencies, interdisciplinary approaches and increasingly the co-production of knowledge. Co-production means working with knowledge end-users to make science useful; democratising the research agenda; listening carefully to public discourse about technology and considering and achieving social license for scientific innovations.

My point is that the place of science in society is dynamic and continues to evolve. Similarly and perhaps somewhat parenthetically, public science policies and funding systems are not fixed but have themselves evolved dramatically in the last 50 years and scientists must expect further change in the future. Indeed as I have described elsewhere, public science systems are now undergoing a period of particularly rapid change driven by both extrinsic and intrinsic factors.

This dynamic situation creates challenges. Two are the evolving, highly contextual and potentially conflicting perceptions of the role of the *public expert* on one hand and *the public's attitude toward science* on the other. At times there is public skepticism towards new and controversial technologies, while at other times there is high public support for more science-informed decision-making in the public sphere. Sometimes these are in overt conflict and both are affected by the many biases that affect perceptions of reality.

Science has been defined as the only processes by which we can gather relatively reliable information about our world. This definition sees science as a set of processes, not facts, and accepts that science cannot provide all the answers. Protecting and promulgating the integrity of these processes and their standards is key to legitimising the expertise of the scientist and ensuring trust in science. And yet the concept of "expertise" is not immune to critical questioning. Research and scholarship in the sociology of science has shown that the legitimacy of the expert relies on a combination of *authority*, built on access to specialised knowledge, and – importantly – *trust*. And it is, in part, how we as scientists handle the characteristics of post-normal science that can either build or undermine that trust.

In the context of post-normal science, it is complicated to communicate legitimate expertise. It is too easy for uncertainties to be exploited or for information to be cherry-picked to support biases. And as the behavioural science underpinning decision-making becomes clearer, we understand that inherent biases are not easily undone by simply presenting science-based knowledge. It is much more complex than that.

If the various scientific and technological controversies and misbehaviours of the modern era can undermine the publics' trust

in science, then it is obvious that ensuring scientific integrity and appropriate communication is essential to sustaining that trust. But trust is also enhanced if publics can be enlisted as co-producers of science. This means making a space for the public voice in the scientific endeavour. Most often this is done in part through elected governments being involved in setting the research agenda through science policy. At a more grassroots level, we see deliberative public dialogues taking place around controversial questions with science at their heart. Public consultation to help prioritise programmatic research topics such as was done in the National Science Challenges is a further example.

Central to all of this is to clearly delineate the respective roles of science and public values – because they both have a critical and essential place. We know that science can never be values-free because there are some critical points where values must enter into the production of knowledge: what to ask; how to ask it; the ethics surrounding it and the judgment needed to assess whether there is sufficient evidence on which to reach a conclusion or to take action. None of these steps is the domain of the scientist alone. But scientists must protect the collection and analysis of data and the formal processes of science as much as possible from their own and anyone else's personal values. The enduring standards of the scientific process are what earn science trust, give it legitimacy and secure its privileged place among epistemologies.

But human values inevitably enter into the question of the *application* of science. Indeed the issue of social license for scientific and technological innovation is enormous and one to which the scientific community arguably has been insufficiently attentive and could well limit innovation in the future.

The greater public access to science has allowed for better societal conversation, but the quality of that conversation is highly variable depending on how it is conducted and the sources of public information and bias. Too often, science can be co-opted for a values-laden debate rather than informing the public discussion on contentious topics. Such tactics render impossible any meaningful engagement about the uses and limits of technologies and the inevitable tradeoffs that need to be understood.

The issue of today's meeting is fundamentally one of the communication of science and the rights and responsibilities of the scientist in public. Here there is a nuanced boundary between the appropriately relatively values-free content of scientific processes and the appropriately values-rich uses of science by society and it is this that creates real challenges for both scientists and the publics they serve.

To begin, trust is fragile. Sloppy, fraudulent or, to use Ben Goldacre's term, bad-science or the misapplication of science without regard for social license, increasingly gets media attention and gives rise to justifiable concerns which we perhaps do not give enough attention to. This, combined with societal responses to the pace of technological change and the online ease of access to pseudo-science, leads to a sizable percentage of the population having some unease or frank distrust of some aspects of science.

The recent public survey commissioned by MBIE shows that, while the majority of respondents consider science to be important, nearly half think the science they hear about is too complicated or – worse – too contradictory to understand. In my role I have to address some of these issues; But no matter what the science says,

fluoride or vaccines or reproductive technologies will always be abhorrent to some for a variety of philosophical and other reasons.

Let me be clear, society has a right to override science in restricting the use of any technology but society is best served when rhetoric and hyperbole does not drown out either the measured and evolving scientific discussion or its ability to properly inform the public debate.

But the nature of today's mainstream on one hand and social media and of issues-based advocacy on the other is such that the very questions that should be discussed dispassionately often are not. This is perhaps most exemplified in the shifting use of precaution and the precautionary principle, from one of adaptive management of risks based on our growing knowledge base, to one of total inaction. In turn, this can lead to polarised positions in which science is co-opted in ways that both undermine public confidence in science and limit its future value to society.

In finding a way through this, it is helpful to recall the two outward facing constructs of the relationship between scientist and society that Roger Pielke developed as heuristic in his book *The Honest Broker*– the Issue Advocate and the Honest Broker.

The Issue Advocate is the scientist who collects and presents data with a view to servicing a cause. While it should be incumbent on such a person to apply standard scientific practice and to reflect the scientific consensus, conscious or unconscious filtering can often occur such that the scientific argument directs a particular course of action. Yet the Issue Advocate is the role that many scientists can and should play. It is indeed an important role in elevating issues in the public mind. However, the difficulty is when the distinction between presenting the scientific consensus and actively advocating

beyond the science is lost. This can compromise the integrity of the science, and undermine the possibility of science's arguably privileged status as input into policy.

But scientists are also citizens with absolute rights as citizens to be active and engaged actors in issues about which they feel strongly. The challenge is to manage the tension that may arise between our private and public faces as scientists.

The Honest Broker tries to identify and overcome biases to present what is known, what is not known, what is the scientific consensus, what are the implications for policy and action and the tradeoffs of the various possible options.

These distinctions are not new. What is new, perhaps, is how important they have become to the wider public discourse. One measure of their public salience is the recent cover story by the National Geographic magazine dealing with public mistrust of science. In this piece Washington Post science writer Joel Achenbach highlights the thoughts of noted science communicators, which are worth quoting:

(quote) "Some environmental activists want scientists to emerge from their ivory towers and get more involved in policy battles. Any scientist going that route needs to do so carefully. That line between science communication and advocacy is very hard to step back from. In the debate over climate change the central allegation of the skeptics is that the science saying it's real and a serious threat is politically tinged, driven by environmental activism and not hard data. That is not true and it slanders honest scientists. But it becomes more likely to be seen as plausible if scientists go

beyond their professional expertise and begin advocating specific policies." (end quote)

So with this in mind let us reflect on the NZ science community.

For myself and the growing number of departmental science advisors and advisory groups, our roles and obligations as Honest Brokers are clear whether we operate alone, or via working groups established to address particular questions.

Then there are many scientists employed within government agencies such as DOC and MPI with policy and regulatory or research roles. Such individuals are bound by the rules of State Services that generally require the consent of management to communicate their professional knowledge outside of their workplace. Fundamentally no civil service or indeed private sector employer gives employees the right to be free agents outside their employment on the very matters they are employed to deal with. This is understandable.

University academics, for their part, are in quite a different position. They operate under the principle of academic freedom that is enshrined in law. Society values that academic freedom and in general, university staff have neither abused it nor ignored it. As a result the excellent profile of many academics in the media is well deserved. The one caveat is the growing evidence that university press offices tend to over-hype academic stories and can undermine confidence in the science and the scientist.

One growing issue for university academics is that of conflicts of interest, particularly those that arise because of sources of funding. Transparency is critical but there is no doubt that the increasing drive worldwide to engage the private sector with Universities is

creating tensions. The increasing dependence of academics on co-funding means that such issues provide an easy target for criticism which is sometimes justified and sometimes not. Arguably, less attention has been paid to issues arising from scientists heavily engaged with issues-based NGOs, but increasingly scientific journals are expecting such interests to also be declared. This is a complex area where policies are still evolving.

Increasingly university research involves the private sector, and the associated contracts often establish some parameters restricting public communication of commercially sensitive information. But University technology transfer offices are generally very good at narrowing those clauses and beyond this, Universities leave decisions over public communication to individual academics.

Academics are increasingly being engaged by governments in advisory processes and this is desirable. However, it is important that any academics speaking to government or to the public delineate the limits of their expertise. When I am asked to advise on specific issues, I identify the subject matter experts and serve as a conduit for translating relevant information to the government. But importantly there needs to be consistency between what individual academics say in public and when part of an advisory process. To be credible there also needs to be consistency between what individual academics say in public and when contributing to an advisory process.

New Zealand is unusual in that half of our publically funded scientists operate in research institutes outside the university sector. Excluding defence related science, equivalent arrangements in many other countries are generally far more modest. Here again, history is instructive: NZ science largely occurred within DSIR and other ministries until our universities in the 1960 and 70s started to

promote research degrees. DSIR and then the CRIs, were designed to prioritise the research effort in areas where the universities were not seen to have a primary role. But what was distinctive was that CRIs were set up as state owned companies with the multiple functions of conducting government-needed research, public good research, supporting and assisting private sector research and making a return on investment.

It is understandable that some CRI employees would prefer to operate under the same rules as academic staff but this is not the case legally. They are employees of a Crown owned company. and with it comes different roles to that of academics as enshrined in the Universities Act. This means less autonomy over public communication – whether these restrictions are always necessary to the extent that some perceive to exist is another matter.

Given many of our scientists are employed in CRIs and in key areas of public interest, this is an issue that merits reflection. But in so doing, let us also remember that the practices governing the conduct of CRI scientists were adopted directly from predecessor agencies. The rules have not changed. What has changed is the changing nature of the relationship between science and society and the societal context in which CRIs operate..

Have CRI managers have become too risk adverse to the public role of CRIs? Should they encourage their staff to engage more in public communication, particularly in the role of honest broker. As I understand it, the issue seems to be an assumption that enhanced public communication could harm the ability to get commercial contracts or contracts from the Crown. There is no fundamental reason why this should be the case provided that sensitivities are appropriately handled and, contextualized as University TTOs have done.

Thus while tensions would arise with management for a staff member acting as an issues advocate given the mix of functions that CRIs have, there is real merit in a constructive dialogue with CRI management over enhancing the public sharing of expertise. I have started such a discussion with Science NZ on this very matter.

In crises and emergencies, the responsibilities and obligations of science to society become particularly acute. The timing of such events means that the boundary between advice and decision-making must inevitably become blurred. Scientists in these roles thus have particular responsibilities in how they package their advice. And this responsibility spills over to other scientists who engage with the public during emergencies. Indeed, experience suggests that policy advisors are often influenced by their reading of the media, and this flows into the totality of their policy advice. For this reason and for the interests of the public, ensuring that the message carried through the media in times of crisis is correct and appropriate to the situation is paramount.

Thus it is not surprising that events such as L'Aquila and Fukushima have exposed issues about scientific trust and advice and have led to a lot of soul searching by the scientific policy community. Many august bodies including the Global Science Forum have been reviewing their guidelines as a result and this conversation has expanded to a broader consideration of the responsibilities of scientists in public communication.

Perhaps the most important summary is the Singapore Statement on Scientific Integrity arising from the second world conference on research integrity in 2010. (I have printed out copies for those who have not seen it). Article 10 is most relevant to today's discussion. It reads

Researchers should limit professional comments to their recognized expertise when engaged in public discussions about the application and importance of research findings and clearly distinguish professional comments from opinions based on personal views.

Similar statements appear in many guidelines produced by academies. However, one does wonder just how many scientists or trainees are aware of such codes and whether current codes adequately consider newer methods of communication and public engagement.

The culture and structures of science are designed for and thrive on skeptical and constructive debate, but it does us no good to confuse that inherent component of science with our obligations to the public. In the media this confusion is often manifested in the drive to find a contrarian view in order to present a false 'balance' in a putative debate, completely disregarding any overarching scientific consensus and emphasizing instead the uncertainties. Here, the media are seeking controversy and we need to work with them to end this practice.

Clearly the relationship between science and society is changing. It was in that context that the National Science Challenges panel recommended the Science and Society project that culminated in the release of the "*Nation of Curious Minds*" which aims – among other things - to encourage the science community to reach out more to society. One recommendation was that the Council of the RSNZ be asked to consider whether their code of ethics is up to date or might need revision for the changed world in which we live. Asking the science community to review their own code independently of government, which may or may not need any

change, is a healthy thing, particularly given the ever-evolving context that I have described. I remain astonished that this recommendation could have been misinterpreted in its intent.

I have argued that science ultimately depends on social trust and it's the integrity of its processes. As the relationship between science and society changes, scientists must consider how their role will change but in doing so we all need to ensure that trust in science is sustained. It is easy to blur boundaries – when does scientific debate over complex matters stop being scientific and become a values debate?

And scientists can take different roles in such debates provided their role is clear. As scientists, we want to be complete and engaged members of society. But when we use our privileged position to speak to governments or to the public, we need to try and be honest brokers of knowledge. Alternatively we must make clear and understood our vested interests if we choose to take on the role of issues advocates and extend beyond the science. For those among us who wish to advance a cause that extends beyond the limits of our expertise, this is our right as citizens, but in that situation, roles must be clarified if trust in science is to be sustained.