

## **Arthur E Mills Memorial Oration to the Royal Australasian College of Physicians**

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### **Science and public policy – reconciling two cultures**

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The cliché in the title is well-worn and I hesitated to use it – but clichés are persistent memes because they encapsulate well understood thoughts very effectively. Science and Policy are indeed distinct ‘cultures’, each with their own language, customs and practices. But the word in the title that truly merits emphasis is “reconciling” for there is much about our future condition that depends on greater connection between these two cultures.

There are both real and perceived issues. In a number of countries including New Zealand, increasingly effective attempts are being made to bridge this gap and to more effectively integrate evidence-informed advice into decisions that affect us all. But ultimately there are limits to how these two cultures inter-twine, and the challenge becomes how to further assist the reconciliation.

Policy-making and decision-making are not the same – each informs the other in an iterative way and the roles overlap. Policy-making is primarily a process of identifying problems and exploring the options to address them. It is ultimately the politicians that decide between options to define policy. Policy-making is rarely simple but the process provides the analysis and framework on which decisions about the inevitable tradeoffs have to be made. Most of the considerations are values laden and this is why politics is inevitably so contentious. Obvious considerations include public opinion, the electoral contract of the day, fiscal priorities, diplomatic considerations and assessment of risk and reward both politically and economically. If policy making was simple, Parliament would be boring and we could put a lot of journalists out of business, not to mention how blissfully quiet would be the blogosphere!

Some issues that policy-makers address are straight-forward and uncontentious and receive little media attention. But many are contentious or become contentious – generally because the values components are real and because there is often no right or wrong answer. Obvious examples are in debates over issues such as taxation policy within realms of fiscal prudence, itself a judgment with a high values content or debates surrounding harm reduction vs more absolute measures to deal with alcohol and drugs. These debates have a strong philosophical basis that often is somewhat tritely reduced to a uni-dimensional characterisation of left versus right - leaning ideology.

So where does science fit into this? Well most obviously it is science that leads to the technologies that change our world, our society and the way we live. Virtually every part of our lives – from what we eat to what work we do to how we spend our leisure time depends on the fruits of science and technology. It is ultimately the use of science and technology that allows populations to be healthy and countries to become wealthy. It is the combination of the knowledge of science and technology with the values of the humanities that makes advanced societies what they are.

And if we look around, it becomes clear that science and technology are at the heart of the biggest issues we face as a global population – both as the source of solutions, but also as a cause. We must admit that as well as solving these issues, science and technology have contributed to creating them – the demographic explosion of a planet facing in excess of 10 billion people and in some societies, an aging population, rising CO2 levels, the NCD crisis and so on. This reality has created some of the skepticism we see today about the role of science in society.

But the nature of science has also changed. While the changes are not subtle they are poorly recognised. They lead to a profoundly different way of working and of contextualizing the knowledge that science produces. These changes require that we acknowledge the epistemological vulnerabilities of science and making a deliberate effort to broaden its societal reach.

In understanding these changes, first we need to remember what science is – it is not a compilation of facts. Rather it is a set of processes used to gather relatively reliable information about the world we live in, our societies and ourselves. It is the formality of these processes that gives science its privilege and validity over other claims to knowledge about our world that can only come from belief, received wisdom, or anecdote. When this formality is broken – whether by unsupported claims, hidden biases, lack of reproducibility, and inadequate peer review, public trust in science is harmed and its privilege is undermined.

But, maintaining trust is more easily said than done – and here we come to a second feature in the recent transformation in science. Science used to tackle only relatively linear problems and inform society in a very linear (and indeed uni-directional way). For instance, antibiotics could kill bacteria; vaccines could prevent whooping cough; clean water supplies could enhance a community's health; renal disease causes hypertension and so forth. To the extent that the policy maker needed science it was uncontentious – it was simply information to put into the mix.

But the processes of science and the contexts into which it is now applied have changed. This is in part because of the bio-science revolution that followed Watson and Crick, in part because of computational and imaging power that allows much more complex systems to be addressed, and in part because, as a society, we now demand solutions to more complex problems. Now science must deal with non-linear systems of immense complexity and often with a great deal of uncertainty. It may be about climate change, or managing the balance between dairy intensification and maintaining water quality or dealing with adolescent morbidity. In many cases, it is about trying to make apparently objective estimates of probability or risk with inevitably incomplete understandings of the system and with quite different understandings of the meaning of risk by – say – the statistician compared to the general public or in turn the politician. Think about how your patients understand and perceive risk. This will very much depend on how you convey the information and in turn how that is done depends on what you know and what you believe – which are not the same thing. But it will also depend on your patient's own biases and prior knowledge – whether reliable or unreliable.

And underlying these points is perhaps science's most fundamental change – its integration into society. There is no denying that until recently science has been patronising and positioned rather isolated from society. But in the late 20th century there was a broad recognition that science like medicine had to engage with and recognise it was part of society and to recognise the extent to which it both shaped and was shaped by the social context. In retrospect, however, we can see that this initial period of the so-called “social contract” between the science and society still kept science mysterious and inaccessible. Scientists were expected to produce relatively reliable knowledge and everyone else was expected to trust them in their quest and – somehow – it was hoped that new knowledge would eventually be put to good use.

But slowly the science community has come to recognise the mutually reinforcing relationship between science and society and, indeed, the significant and appropriate influence of society – through government, media and civil society – on shaping the scientific agenda.

This itself is an uncomfortable shift in the balance of power that the science sector had enjoyed for so long, and was the shift that medicine itself faced several decades ago. But it is critical the mystique of expertise is replaced by really meaningful engagement.

This is not an easy shift and it is made harder by the relatively low science capital present in populations such as ours. It will be important that governments, citizens and the science community together make real efforts to bridge this gap between science and society. In New Zealand, these issues have been part of the National Science Challenges process, where we recognised that none of the challenges could be successful without both a fuller social engagement from scientists, and broader efforts at strengthening New Zealanders' own relationship with science and technology right from the earliest stages in primary school.

This renewed and recast relationship is delicate. It can go well, and it can go badly. It is done badly when science overstates what is known and does not admit to what is unknown about contentious issues. But at the same time, it is made more difficult when the almost inevitable hope of the politician is for the certainty of black-and-white answers, where science can only serve to reduce uncertainty. Indeed, one of the biggest dangers in science-based advice – whether it is given directly to government or to a patient in the clinic, is not acknowledging the inferential gaps that may exist between what is certain in the science and the conclusion that is reached. We need only look at the l’Aquila affair, which sent earthquake scientists to prison in Italy, fairly or not, which was essentially a result of ignoring that inferential gap and overstating certainty.

The relationship is also mishandled when the science community assumes that science alone can make policy – it does not. Policy is informed by evidence but also by those many values laden dimensions inherent in the social and political realities already discussed.

Finally, in this new relationship, it is also important to not assume that science itself is value free. It is not. We do our best to use the processes of science to protect our results from the influence of values when we analyse data, but in reality, values abound in science, so we need to identify them, understand them and ultimately minimise their effect. Values are inherent in what scientists choose to study, how they frame their questions, their methodological choices, and in how they interpret and communicate results. Managing and acknowledging those values properly is essential if science is to sustain its privileged position in the advice process.

So how do I view the science-policy nexus? Simplistically it can be described as providing the base evidence on which to identify problems and potential solutions and then leaves it to policy makers to add the more overt values laden dimensions. But this is a linear and outdated model. The policy process itself is an iterative and consultative process and science has value at every stage in the policy cycle. The ongoing role of science in the policy process is critical and nuanced. Central to this is being clear about what is evidence based and what is largely values based.

This is important because in recent years, we have seen many examples where the complexity of science has been used by interested groups as a proxy to debate when the issue is really one of values. Climate change is an obvious example: There is virtually global unanimity amongst climate scientists that despite uncertainties, the world is facing anthropogenic climate change with certain and profound impact. There is of course much debate about the detail and the pattern and timing of change because it can only be an observational and predictive science. In this uncertainty, there is opportunity for legitimate scientific debate, but that debate has largely been displaced by using scientific complexity as an excuse for a proxy battle which when peeled away is really a values debate over the economic interests of this generation versus the next. Should this generation make complex economic choices which will have a cost but will benefit the next generation or can we afford to continue with business as usual and hope that the scientific community is wrong or that technology will solve the problem? Science can easily get damaged in such proxy debates – whether it is about stem cells in research, or fluoride or measles vaccines or GM technology.

These issues are very current and are not easy to address. Fundamentally the role of science and that of making policy have two very different frames of reference yet need to interact. Increasingly countries are recognising the need for intermediaries. This system of mediation may be based on committees, academies or individuals like myself. The roles and rationales for promoting engagement through these different mechanisms may differ but some principles are clear.

First and foremost the challenge is one of trust: the intermediary knowledge broker must simultaneously maintain the trust of at least four stakeholder groups: the politician, the policymaker, the public and the science community – a real challenge. Each group expects something different from the intermediary and the science community often confuses the role with that of a lobbyist for them. This can have the effect of undermining the trust of the others in the role. It requires a sense of accountability – both by scientists producing new knowledge, and by policy-makers and politicians whom we expect to put it to use. This creates difficult issues of when

scientists should act as knowledge brokers and when as citizens they act as advocates for a cause. Increasingly this almost impossible distinction may need to become clearer if science is to keep its privilege and to earn the respect of the policy maker.

There are obvious issues, such as protecting the independence of advice, acknowledging the limitations of science and being clear about what we know and do not know, to understand how science informs but does not make policy, and the need to ensure honest brokerage of information. On the other side, if these principles are followed policy makers can benefit from closer interactions with the science community.

A healthy society will need to use much better the tools that I have been discussing. The nuances in understanding risks and tradeoffs are vital, the need to understand how to make decisions in an uncertain world and how to use objective evidence better in policy making is obvious. There are obligations on both the scientist and the policy maker. There are many analogies between what I have been saying and the conduct of your profession – knowledge, values, expertise, beliefs, understandings of risk and trust are all intertwined in a relationship that has changed dramatically in the last 50 years. A good physician is one who can act as a broker between the evidence and the social, spiritual and values context of the patient. A good physician today knows that patients, their families and their social context must be taken into account and that application of medical advice and dialogue over therapeutic options is more complicated than it was once assumed to be. The wisdom and collective progress of your profession has much to teach those of us operating at a different interface.

Thank you