False Dogmas of Science in Understanding, and Practising, the Precautionary Principle

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ENSSER Annual Conference, *Science, Precaution, Innovation: Towards the Integrated Governance of New Technologies*, ZIF, Bielefeld, 14-15 Oct 2019

A Preface to Precaution-Talk: scientific (non-)knowledge

- On Day One there was considerable discussion albeit across disparate domains, of **how the PP is connected with what is called "scientific uncertainty"? and of what warrant there is for precautionary intervention in R&D&I**?
- There is much confusion about both "scientific uncertainty" and about warrants for (*what kinds of*?) regulatory intervention.
- Research going back to the 1980s has shown that anticipatory or precautionary forms of regulation aiming to improve environmental outcomes do not show that PP is a hindrance to innovation. It does instead show that PP regulation redirects prevailing innovatory trajectories, and those changes in technological choice do in turn however sometimes disrupt dominant profiles of commercial advantage and power.
- It also remains true that PP-compliant regulation is just as much science-based and scientific research-stimulating as is conventional non-PP regulation. Again, it changes and enhances scientific research agendas, and arguably renders science overall more diverse and robust.
- Scientific bodies and practitioners themselves need to become more willing and capable of collective, open reflection about their own specialist knowledge, including how scientific research and policy advice have been harnessed and framed in ways which limit scientific self-reflection and flexibility, while at the same time perversely aggrandising the political scope and power given to science. This leaves science acting as a covert and illegitimate mouthpiece for private commercial interests. Instead of *informing* public policy, science has been made to *frame its meaning.*
- Science's long use as key means of public authority has left it unable to articulate its own limitations and contingencies
- This has left scientific knowledge-authority to be exaggerated by public policy and media, and by private interests which use science to misrepresent their own private interests as if they were the innocent and disinterested "Voice of Nature alone"

Example references, slide 2, bullet pt.3

- Ashford, N., C. Ayers, R. Stone (1985), Using Regulation to Change the Market for Innovation, *Harvard Environmental Law Review* 9, 419–466:
- Blazejczak, J., D. Edler, J. Hemmelskamp, M. Jänicke (1999), Environmental Policy and Innovation – an International Comparison of Policy Frameworks and Innovation Effects, in P. Klemmer (ed.), *Innovation and the Environment*, Berlin: Analytica, 9–30:
- Green, K., A. McMeekin, A. Irwin (1994), Technological trajectories and R&D for Environmental Innovation in UK Firms, *Futures* 26, 1047–1059.
- Jaffe, A.B., R.G. Newell, R.N. Stavins (2002), Environmental Policy and Technological Change, *Environmental and Resource Economics* 22, 41–69)

Precaution Should be *Normal*

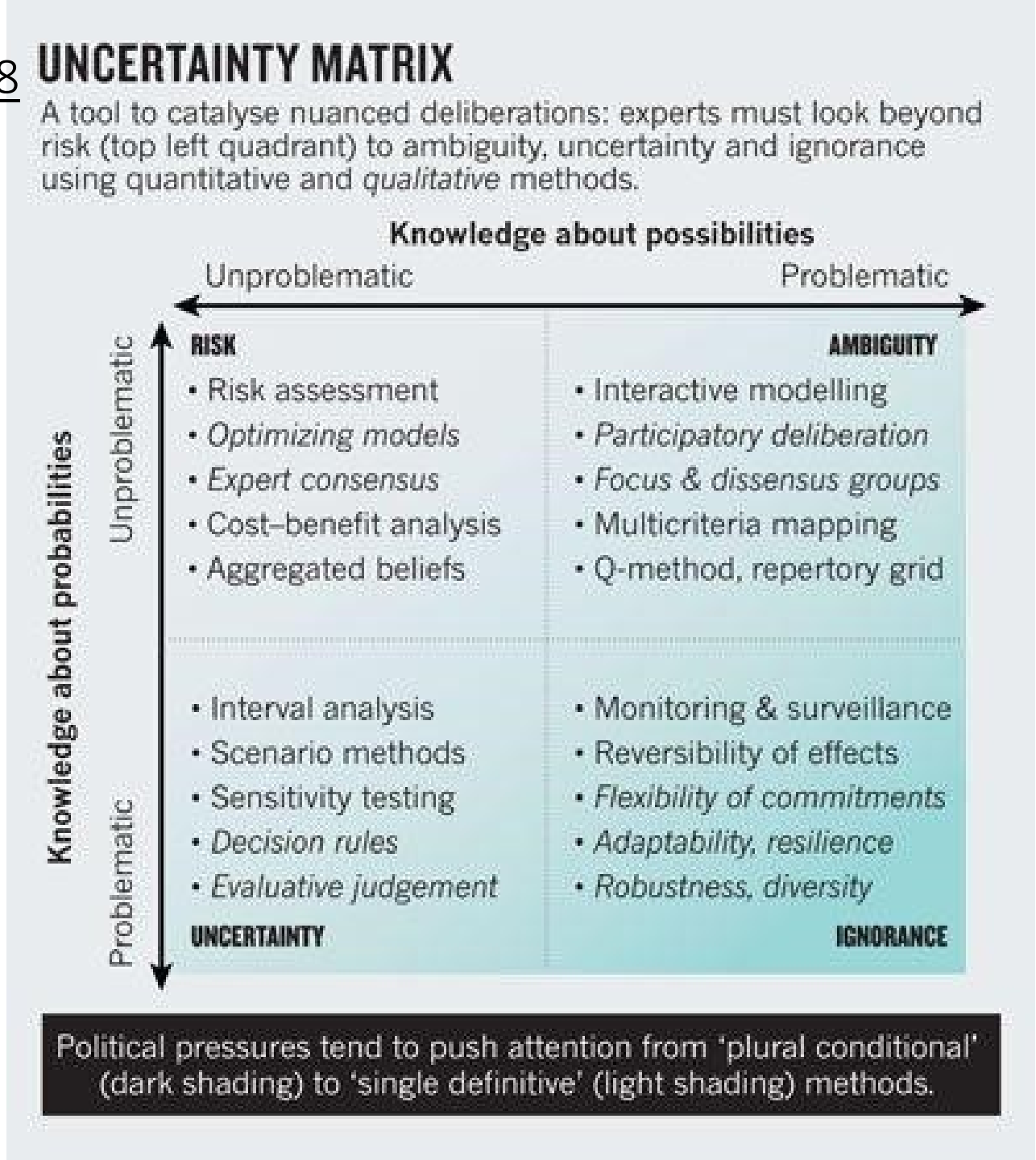
- While it is widely assumed that the PP should be selectively applied in policy decisions involving science and technology, I want to argue that it should be normal, and always enacted where harm is possible. This results from the defining statement of the PP - that regulatory intervention can be enacted where there is reason to believe in *possible* harm, and scientific uncertainty cannot be used to prevent such intervention.
- My point is that there is always "scientific uncertainty", of particular kinds which have not been adequately recognised by scientists as policy advisers, and have been excluded and denied as relevant knowledge-conditions.
- These distinctions between different qualities of "uncertain knowledge", and the crucial omissions from them which almost thirty years later science for policy still makes, were first published in the 1990s by myself (1992), and elaborated and improved by Stirling (1997). Both spelled out the practical implications of those omissions, and why dealing with them requires a more ambitious form of PP. This framework was used in the EEA *Late Lessons from Early Warnings* volumes in 2002 and 2013. I explain these neglected, but fundamentally different, forms of "uncertainty" next.

"Risk" involves uncertainties far beyond just calculable p and C (Wynne, 1992)

- RISK - know the probabilities and effects, R= p.C
- UNCERTAINTY – may know the possible (credible) effects, but not the probabilities
- IGNORANCE - do not know some key effects ('unanticipated consequences'); so don't even know the correct questions to ask. This is a *predicament* for science
- INDETERMINACIES (CONTINGENCIES) – complexities outreach controls, including predictive 'control'); and *conditions* of knowledge forgotten, so hyper-extrapolation from limited conditions. Hypothetical basis of this "knowledge" deleted and denied – dogma
- AMBIGUITIES – what does the issue mean to people? - "risk" as defined by science, or more?

All of these *incommensurate* dimensions are typically reduced to "Risk" alone. If "scientific uncertainty" is acknowledged, this is taken to mean that *'we will have control soon, once we do more research (within the same 'closed' paradigm)'*

Stirling, 1998



Risk Assessment and Uncertainty, Ignorance and Indeterminacy: neglected epistemic – and policy – options and trade-offs

- Precision is the presumed defining quality of knowledge for good science. Precision (appears to) equal *Control.* Risk assessment is an idiom of control
- But good science also requires *realism*; and a further valued epistemic principle is *greater scope* (Kuhn, 1962, also identified symmetry, and 'elegance' here!)
- These three different criteria are sometimes in conflict, and which should be given greater weight depends on *what is the purpose for which we are developing the scientific knowledge*? The rigid priority given to precision ('control') in RA is not justified, especially when we aim for precaution. It tends to devalue scope, while emphasising epistemic reductionism, and atomisation of system complexities.
- These are not precautionary, indeed they likely exclude salient harm factors
- These 'scientific' questions have integral policy dimensions, and require accountable and open deliberation in lieu of monolithic presumption

Pasteur, NASA, on CFC-Ozone Surprises for Science

"Surprise comes to the Prepared Mind" – Pasteur

The CFCs-stratospheric ozone case,

- CFCs risk assessed and approved in 1960s
- 1979, Lovelock declared, "no conceivable environmental harm" from CFCs atmosph. releases
- 1985, Farman *et al*, *Nature,* reports O_3-CFCs 'hole'
- The 1960s RA did not know about CFC migration to stratosphere, nor about chemical reactions under UV and T conditions, so ignorance caused neglect of major harm, and colossal extra costs, incl. thousands of deaths from skin cancers
- NASA denied Farman's findings initially, and missed it in their own 'more precise' automated satellite data, because they had programmed in a prior filter-assumption that O_3 concentration-changes of Farman's reported magnitude must be false-data.

SCIENCE UNDERSTANDS ITS OWN IGNORANCE ??

"[AEBC]: Do you think people are *reasonable* to have concerns about possible 'unknown unknowns' where GM plants are concerned?

[ACRE Chair]: *Which* unknowns?

[AEBC]: That's precisely the point. They aren't possible to specify in advance. Possibly they could be surprises arising from unforeseen synergistic effects, or from unanticipated social interventions. All people have to go on is analogous experience with other technologies….

[ACRE]: I'm afraid it's impossible for me to respond unless you can give me a clear indication of the unknowns you are speaking about.

[AEBC]: In that case don't you think you should add health warnings to the advice you're giving ministers, indicating that there may be 'unknown unknowns' which you can't address?

[ACRE]: No, as scientists, we have to be specific. We can't proceed on the basis of imaginings from some fevered brow…."

[UK AEBC public meeting, London, 2001].

ACRE - UK Advisory Committee on [GMO] Releases to the Environment (EFSA GM panel equivalent)

AEBC – UK Government Agriculture and Environment Biotechnology (Strategic) Commission (disbanded 2004)

IPCC advice to its scientific authors about the perils of prevailing paradigms

Be aware of:

“the tendency for a group to converge on an expressed view and become over confident in it.

Views and estimates can also become anchored on previous versions, or values, to a greater extent than is justified”.

(Guidance Note on Uncertainty to its 4th Assessment authors, Intergovernmental Panel on Climate Change, 2005)

What if Contingency and Ignorance in Scientific Knowledge *were* to be recognised and addressed..??

- Typical scientific response is that the public is terrified by “uncertainty” (let alone ignorance or indeterminacy), so “we have to ‘background’ it”
- This ‘blaming the victim’ (“don’t frighten the children”) excuse conceals the policy and science institutional assumption that their public legitimacy depends upon showing control (even if illusory). Policy frames the questions to RA so as to help delimit the visibility of ignorance and lack of predictive ‘control’, and as the earlier slide showed, some senior scientists do not understand the nature of this problem
- Moreover this blaming of the public for scientific denial of ignorance is contradicted by social scientific research on such typical publics, which shows that they encounter and deal with multiple unanticipated hazards and contingencies every day, without the panic normally also attributed to them, and feared by elites.
- Instead, there are some rationally-based options which could be experimented with, and learned from. For example:
- Though we cannot precisely define degrees of scientific ignorance, we can identify some conditions under which it is likely to be greater or lesser – and then attempt to generate the lesser. For example, the faster we are attempting to generate commercial innovation returns from some lively but immature scientific research understanding, then the more likely, all else equal, will surprises which risk assessment is unable to imagine be forthcoming if the innovation is approved for social uptake. Why is speed so apparently essential? Could that be a policy question, for inclusive deliberation? [CONTd.]

[CONT.d] What if Contingency and Ignorance in Scientific Knowledge *were* to be recognised and addressed..?? And *inter alia*, might it also be good for science?

- In face of accepted likely scientific ignorance, it is logical to **prefer a diverse portfolio of innovations**, to have alternatives available if one comes up with unexpected future harms. Secondly it is logical to ask, before accepting such unpredicted effects, **what are the compensating benefits?** or **whose needs is the innovation in question intended to meet?** Are there indeed benefits, and to which social groups? or might they be seen as useless, or create harm, not only health or environmental harm but social or economic or ethical harm, to voiceless social groups? The diversity principle also logically raises a further important policy principle, which is that **any proposed innovation should never be assessed alone, but only in comparison with alternative possible innovations** for meeting the same needs, such as for mobile energy, or for accessible and sustainable food-production and distribution. Vanloqueren and Baret (2009) have shown how in the food-ag domain, processes of institutional lock-in can become hegemonically established, from arbitrary and small initial advantage. Diversity, and rescuing arbitrarily suffocated alternatives, both need proactive policy initiative
- These policy innovations are completely outwith prevailing institutional and legal structures and processes, which instead require obeisance to legal norms which require questions of harm or risk to be the only hurdles for regulatory approval, and with a powerful presumption in favour of development. Benefits questions of the form outlined above have been entertained, but largely because the long-entrenched assumption that benefits as defined by big corporate commercial interests, including as they define it, private intellectual property rights, or market hegemony, could be taken for granted, on the traditional liberal model that the definition of the general public benefit was the addition of all and any autonomous individual person's imagined benefit from their own proposed innovation. No more systematic and inclusively deliberated regulatory treatment of questions and evidence on the benefits issue has yet been designed or tested to my knowledge, with the exception of the Norwegian Gene Technology Act of 1995. Wickson and colleagues have studied these more comprehensive governance principles, and made coherent proposals relating to them
- The question remains open as to how such a strict understanding of the scientific basis of the Precautionary Principle, with the extra demands this would place on citizens to become involved in collective structured forms of citizen deliberation. If we take key principles such as Sustainability, Equity and Justice seriously however, and if we also take more and more sophisticated technologies as some form of human birthright, I suggest that the demands of greater collective deliberation over such matters might be a fair – and essential - price to pay in exchange? We do not know; but we do know how to find out…

And if we take the contingencies point seriously…?

- This also requires that we – democratically, and thus *inclusively* - deliberate over the proper *conditions of* development of such technologies.
- This also includes deliberation over their original scientific forms of intervention and research, which are also already forms of technological intervention (hence, "*techno*sciences" - Latour, 1987);
- This will demand huge proliferation of governance through collective deliberation, and of strategically oriented research, scientific and human;
- Furthermore, for this to be thorough and consistent scientific reflection and review, the alternative *epistemic* options within a scientific programme for society must consider also the alternative - for example less reductionist and mechanistic – possible forms of good science which are available, if we chose
- The precautionary principle requires more, and more radical, innovation - not less

"The guidelines for environmental risk assessment of EC 2002/63, in which formal standards are described for the documentation of all uncertainties and disagreements in the scientific knowledge-base, and of EC Regulation 2002/178 (Art 30) on dealing with disagreements in risk assessment between EU authorities and member states, should be fully and transparently enforced, and this audited externally[1] "

Wynne and Felt, 2007, chap 8

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[1] EU Regulation EC 178/2002, Art 30, states that when different scientific opinions emerge, EFSA and the member state(s) "are obliged to co-operate with a view to either resolving the divergence or preparing a joint document clarifying the contentious scientific issues and identifying the relevant uncertainties in the data. This document should be made public"