

Reflections on 'informed critical resistance, reform and the making of futures'

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Thanks to the great work of Jeroen van der Sluijs and his comrades, Post-Normal Science has visibly changed its character. Up to now, ever since 1989, it has been a critical insight. Now it is becoming a movement. The presence of so many committed and excellent scholars here is evidence that the time is indeed ripe for such a change. Now we face new opportunities and new tasks and challenges. I would like to discuss these.

I can sum up the past with one precious anecdote. I had given a lecture to a group of young scientists working for the European Commission. There was a lively discussion, but I noticed that one person remained silent. Then at the end, when there was a general shuffling of chairs, she came towards me. I greeted her, and she just said, "Until tonight I thought I was crazy". She turned and left, and I never got her name. But it was one of the most important encounters of my entire career. For me it expressed what PNS has been all about.

The function of PNS up to now has been one of liberation, through demystification. There has been a received faith in science, with three key propositions. First, that science is a truth-machine, making no errors. Second, that it is a fountain of facts, ready for application for the benefit of mankind. And third, that in science

every problem has just one and only one correct answer, precise to three significant digits. Is this a caricature? Rather, it is the 'hidden curriculum', implanted in science students of every sort and at every level, nearly or quite up to the highest. Those who privately suspect the validity of this unquestioned common faith can genuinely consider themselves crazy, until they hear the good news of Post-Normal Science.

As awareness of the true character of science has changed, PNS has provided a perspective for making effective criticism. Silvio Funtowicz and Andrea Saltelli have led the charge on the study of the erosion of skills and the collapse of quality assurance in the research enterprise. From a PNS perspective they have been able to question whether the many laudable attempts to clean up the corruption of the research enterprise can succeed, in the absence of a deeper analysis of its causes. I have a few ideas about that deeper analysis. Phil Tattersall and I have shaped up a theory of 'Science of Bads', which is like a mirror-image of the ordinary science of Goods. That is about positive things that are discovered with a general benefit; while 'Bads' deals with negative things that are uncovered, with benefit to some and embarrassment to others. With Christiaan deKoning I have started work on the shape of science in the Fourth Industrial Revolution, which is focused on information rather than on energy. And I have my perennial concern for the idolatry of numbers, whereby major industrial and environmental policies are defined by what must be called digital nonsense.

Now that we in PNS are becoming a movement, with reform as one of our objectives, we must consider what it is that we are trying to change. First, science is big. The public-knowledge research sector has been estimated to have a turnover of some three hundred billion dollars a year worldwide. It is significant that this is only a rough estimate; science has no scientific accounting system! In addition, there is the for-profit corporate sector, plus the state-civil and state-military sectors. Teaching and popularisation are also big, and there is the small but crucial sector of science advice. The variety is enormous, and there are a corresponding variety of responses to the perceived crisis of science. There is a rapidly growing effort in the critical analysis of the social institution of science, and a perception that the old isolated, elitist ideology needs to change. A recent issue of *Nature* magazine highlighted the slogan 'Science Shared', almost quoting PNS without attributing to it. But the inertia of the major institutions of public-knowledge research, and even more of teaching, must be recognised in any assessment of our tasks.

The deepest changes in PNS will occur when we launch Jeroen's programme and engage on Reform. Although I cannot anticipate how this will be done, we can be sure that reform will be resisted. At that point PNS will be involved with power. Power does not necessarily always corrupt, but it certainly always presents pitfalls. Marta Struminska's paper today provides a very timely analysis, identifying three kinds of ethical risks, of opportunism, paternalism and relativism. For me it all goes back to the character Doctor Stockman in Ibsen's play *Enemy of the People*. Was he a victimized early hero of Post-Normal Science, or rather was he a

disastrously naïve enthusiast? And suppose that the corrupt local elites knew how to tame him; could he have resisted their blandishments? In the same situation, could we?

Turning to science, I can now see two sorts of fault-lines that could open science to the reforms of the sort that we desire. The first is the possibility of the collapse of public trust in the symbol of science, as part of the general process of distrust that now affects so many of our major societal institutions. It is impossible to predict when, or even whether, there will be a major scandal in science that leads to widespread public anger and disillusion. But it is equally impossible to be sure that such a scandal will not occur. In the absence of effective internal quality assurance and of effective external investigative journalism, abuses can fester in secret until they explode.

The second fault-line is more predictable: the changing character of the research workforce in the public-knowledge sector, consequent on its industrialisation. We can really speak of research proletarians, exploited in every way and having no job security or workplace rights. I find it highly significant that in the first American March for Science last year, after some discussions there were no less than three chairpersons. Along with Bill Nye the famous 'science guy' there were two activist women of colour. One was the heroine of Flint, Michigan, who defended the lead-poisoned children there against the complacency of the united scientific and health establishments; and the other was a longstanding advocate of minority rights within research science. It is still very early days in

the political maturing of the research workforce, but this is a trend that will be difficult to reverse. One can even imagine a bifurcation within science, between the socially elite grantholders, whose connections with funders guarantee a steady stream of contracts, and the non-elite researchers, hoping in vain for social mobility or even for job security.

Faced with such challenges that were not even imagined in its first formulation, PNS will need to adapt in fundamental ways. Certainly, the model of its defining problem-situation will need to be enriched. The concept of quality is readily available, especially since Silvio and I had previously dealt with it in our book on NUSAP. Early in the development of PNS we incorporated complexity, in a rather rich version, into our thinking. But we will need to come to terms with power, in all of its manifestations in the social activity of science. This brings us on to politics, and we must be prepared for the possibility that the encounter with political issues will cause divisions within the PNS community.

So far, science as a symbol has not been explicitly drawn into the culture wars that have broken out all over the West, and which are particularly sharp in the U.S.A. But we can observe how some areas of applied science and technology are viewed with suspicion mainly by the Left because of their connections with big for-profit corporations (pharma, as vaccinations and agriculture, as pesticides), while others are viewed with suspicion mainly by the Right because of their connections with the big regulatory State (global warming/climate change). And there are those self-validated

claimants in the healing arts, who will always be with us. In the general political discourse on the Centre/Left there is a distinction between the good democrats and the bad populists. Will we in PNS come to make a corresponding distinction between a good 'extended peer community' and a bad 'distended peer community'?

All these considerations are not to be understood as predictions but rather as precautions. Post-Normal Science is now firmly established. Although the name is still very far from being as broadly embedded in public discourse as Thomas Kuhn's 'paradigm', the idea of Post-Normal Science seems to have become a 'meme', being widely mentioned without an apparent need for a citation. And we have just learned that in a recent survey our 1993 essay 'Science for the Post-Normal Age' received the highest number of citations by all publications which deal with futures, anticipation and prediction. That's encouraging news.

So we are certainly entering interesting times. There will doubtless be turbulence, but there is everything to play for. I thank all the comrades who have brought Post-Normal Science to this launching point, and I hope to continue to be part of the endeavour.