

It's not just about nanotoxicology

A report on nanotechnology published in 2004 by two learned societies in the UK has had impacts in other areas of science and technology, as **Richard Jones** reports.

Five years after the Royal Society and the Royal Academy of Engineering published their widely cited report about nanotechnology¹, we are seeing a certain amount of introspection by the nanotechnology community, particularly in the UK, about its impact. Much of the emphasis of this discussion² is on the issues of nanotoxicology and nanocotoxicology. This is understandable; it was a major achievement of the 2004 report that it highlighted, for the first time, the uncertainties that surrounded these subjects. So it is not surprising that perceived slow progress by governments on a set of very clear recommendations has led to the frustration of a number of groups and commentators. But there is another reason to regret that faster progress has not been made on the issue of nanotoxicology and its knowledge gaps — the ongoing debate about the safety of nanomaterials has overshadowed a number of other issues that the report raised, issues that arguably will in the long run prove to be no less important.

One area in which the report clearly was influential was in promoting the idea of upstream public engagement. The report's injunction that "a constructive and proactive debate about the future of nanotechnologies should be undertaken now — at a stage when it can inform key decisions about their development and before deeply entrenched or polarized positions appear" has been taken seriously. But the public discussions that have followed reveal a much wider range of public concerns than the simple issue of safety, although many of these concerns had already been highlighted in the report (and many of them are not specific to nanotechnology). As any new technology emerges, questions about who controls it and who benefits from it always arise, and with these come questions about governance that rapidly move away from issues of a purely technical nature.

In addition to what the 2004 report actually said, one should not underestimate its importance as an exemplar of a new, more inclusive way to put together such documents. The working party assembled to produce the report was notably broad, including representatives from social science, philosophy and environmental groups as well as the distinguished scientists and technologists that one expects to see on

such committees. The simple fact that the authorship of the report went beyond people who supported nanotechnology (no matter how balanced their views might have been) greatly influenced its tone and markedly increased its authority.

Perhaps one important test of the lasting influence of the report is not so much how it has influenced the debate about nanotechnology, but how much its influence is felt in the way new debates about other emerging technologies are being handled. Two important test cases are synthetic biology and geoeengineering, two potentially controversial subjects that are of great current interest, and both of which are surrounded by considerable uncertainty. Debates on these areas are heating up, and we can take a measure of the tone of the discussion, in the UK at least, from a pair of recent reports.

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The recent report by the Royal Academy of Engineering on synthetic biology³ takes care to discuss potential social and ethical implications of the new technology, and to recommend a programme of public engagement. But, nonetheless, it is difficult to avoid the conclusion that this is a document whose aim, fundamentally, is to promote a technology, emphasizing hypothetical future benefits and using a familiar rhetoric of potential national economic advantage to argue for new research funding in the area. In this context, assertions of the need to consider social and ethical consequences can be read as buttressing the argument that the technology is important enough to deserve more support.

Perhaps the political ramifications of geoeengineering the climate are more obvious, and the uncertainties more pressing, making it inevitable that the recent report by the Royal Society on this subject⁴ has a much more nuanced tone. Although the report modestly positions itself as a "clarification

of the scientific and technical aspects of geoeengineering", it rapidly becomes clear that a clean separation of the technical and political is not possible: "the politics of geoeengineering are complex and contested, and the positions taken by scientists and other analysts may interweave policy preferences with technical judgements."

In the face of profound uncertainty about the effectiveness of any technical strategy, and of the potential severity of its unanticipated consequences, questions about the degree to which such a strategy could be reversed, and how easy it would be to remediate any ill-effects, come to the fore. And when talking about reversibility, it is not just technical questions that are important. Our experience of other technologies show that societies, once committed to a particular technological course, can find it very difficult to reverse that commitment. The reasons for such technological 'lock-in' can be technical, but they can also be economic or socio-political.

The link between these discussions and the 2004 report on nanotechnology is perhaps most clearly seen in yet another report on nanotechnology, published by the UK's Royal Commission on Environmental Pollution (RCEP) last year⁵. Once again, the headlines generated by this report caricatured it as yet another rebuke for the UK government about slow progress in nanotoxicology. However, the RCEP report contained a very interesting discussion of emerging principles for the governance of new technologies in the face of profound uncertainties, and the authors of the geoeengineering report have obviously been influenced by these discussions. We should, then, see the debate about nanotechnology that was initiated by the Royal Society and Royal Academy of Engineering in 2004 as an important milestone in developing a more mature societal framework for debating controversial new technologies. □

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