

This response was submitted to the consultation held by the Nuffield Council on Bioethics on Emerging biotechnologies between April 2011 and June 2011. The views expressed are solely those of the respondent(s) and not those of the Council.

## **Emerging technologies consultation: responses to questions**

1. There are problems with the use of the term “emerging technology”. All technologies represent developments of earlier ones so that it is difficult to define for a “new” or “emergent” technology” at what stage is it new or emergent. Moreover, there are consequences of presenting any technology as totally “new” and/or “emerging”: it offers an opportunity for forces antipathetic to novelty in technology to oppose any new developments. If such a development is presented as a smooth progression from an earlier stage, such opposition is more difficult and the precise nature of the objections has to be defined, not just that it is “new” and “untested”. An “emergent” technology is easier to dismiss *in toto* than an on-going development from something already accepted.
2. All “emergent” technologies are recent developments of older technologies. I do not find it helpful for them to be categorised as ‘emergent’ for the reasons given in para. 1.
3. All technologies, old and new, are likely to have ethical, social and legal implications but some (the plough and the wheel, for instance) are so old that we no longer think about them in those terms. But the ethical and social implications of the plough and wheel were – and remain – as profound as are doubtless their legal implications.
4. Yes: biotechnology (especially as applied to agriculture), mobile telephone, nuclear power and food irradiation have all been influenced by social and cultural factors in recent times. Much earlier, something similar was seen with smallpox vaccination, the pasteurisation of milk, the motor car, railways and even the introduction of the electric telegraph.
5. Yes: as in para. 4 above. If public acceptance is in doubt, development is likely to be held up. Agricultural biotechnology is an obvious case in point, especially in Europe and some other areas taking their cue from Europe. If public acceptance is seriously in doubt (as it is said to be in Europe with respect to agricultural biotechnology, for example) there will be a marked reluctance on the part both of the public and private sectors to invest funding and effort to develop anything with such an uncertain future.
6. Yes: because there have always been some countries willing to go ahead, countries refusing to do so cannot remain unaffected. This is especially true when, as in the cases of agricultural biotechnology, the go-ahead countries (North and South America, for example) are major producers of commodity agricultural goods benefiting from biotechnology which the reluctant ones (the European Union, for example) have to import.
7. Liberal democracies are unwilling or unable to constrain pressure groups with anti-technology agendas no doubt driven by a variety of mainly political and

commercial (but also philosophical) agendas. However, liberal democracies displaying generally a very strong favourable view of innovation (e.g. those in North America) have largely overcome those agendas; the less technically innovative European societies by and large have not, or at least not to the same degree.

8. Such policy issues are related to perceptions of infringement of personal perception and challenges to cherished views and attitudes. They are often dressed up in ethical or moral clothing, and attempts are usually made to present such novel technological developments as damaging, or at least as damaging as they can be made out to be. The evidence in support of such damage is often weak or absent, and, whenever possible, is presented in the most frightening and lurid mode possible.
9. Yes: the political and commercial motivations of those opposing.
10. The political atmosphere and endless campaigning by opponents has promoted the decline of plant breeding research: the UK and in France are graphic examples of where that has occurred. Researchers in transgenic crops, finding their work vilified and unappreciated, either turned in other directions or left for more conducive research environments in North America and elsewhere.
11. Exactly those which are applied to all technologies and other human activities. There is nothing special in that regard as far as biotechnology is concerned.
12. I see no individual or single body as being responsible. In my view all rational people ought to make their rational voices heard. But that does require that they understand what they are talking about; unfortunately, many powerful people in high places responsible for much decision-making in our society are woefully uninformed, misinformed and unschooled in both the underlying science and the technologies themselves. Accordingly, they are essentially entirely dependent on those appointed to "advise" them. I do not know how to resolve that problem, certainly not in the short term.
13. Perverse roles because activists have cynically played on popular fears resulting from ignorance and lack of understanding intentionally to frighten people. "Risk" is deliberately confused with "hazard" while precaution, instead of being seen to be a sensible approach used cautiously, is elevated to the status almost of a religion.
14. There are no good grounds for any regulation beyond those already applicable in the areas of food, agriculture or healthcare: if mutagenesis breeding using gamma-rays or carcinogenic agents needs no specific regulation, then neither do transgenics. Being more precise than earlier techniques, biotechnology is in any case likely to be intrinsically safer, not more dangerous, than existing methods and hence should be subject to *less* onerous regulation.
15. It should play a major role but we do need to find ways of educating and informing – and interesting – the public to the point of their being able to make rational and informed decisions, rather than emotional ones driven by newspaper headlines.
16. Education, education, education: but it will take a while! Evaluate public engagement

activities on the basis of whether or not those taking part understand that with which they are engaging.

17. Perhaps it is the frenetic times in which we presently live and the pace of change, technological and other, which may be almost too much for many people to cope with, particularly if they are not well educated and have little interest in such matters. It comes back again to education over a long period, perhaps at least a couple of generations in the UK even if we were to start now. But we show little sign of doing so....

Professor Vivian Moses

14.6.11