

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.

Nuffield Council on Bioethics Emerging Technologies

Responses

June 14, 2011

1. How would you define an “emerging technology” and an “emerging biotechnology”? How have these terms been used by others?

I view technology as a practical application of knowledge. In most cases, the value of technology is measured by how it improves the lives of people though the concept of improvement is complicated by the markedly different views of what is improvement based on one’s wealth and personal well-being. Qualifying technology or biotechnology with the adjective “emerging” implies that the knowledge is considered by the general population as novel (not necessarily new). Biotechnology has an additional layer of complexity since, in its broadest sense, the term means biologically based technology e.g., modern breeding or fermentation. However, to many, the term biotechnology is much narrower, and means only an application of a process involving recombinant DNA. As such, the definitions of “emerging technology” and “emerging biotechnology” are likely to be vague, personal and perception based.

2. Do you think that there are features that are essential or common to emerging biotechnologies?

Yes. First there is a perception that is the technology is novel or the knowledge used in its development is held by a selective group. Many scientists and developers will promote this perception to garner interest especially in the financial community. This perception of novelty is also critical to the goal of securing intellectual property right protection and exclusivity. I have heard scientists (inappropriately) describe some emerging technologies associated with protein engineering as “accelerating evolution”. This caricature may have been helpful in securing venture capital money, but not in

obtaining public confidence. Also, it took great license in borrowing from the theory of evolution.

Another feature is that newer emerging biotechnologies will build in a synergistic manner from other applications of biotechnology e.g., accelerated breeding that integrates genetic modification with genomics. I no longer view the process of genetic modification as an emerging biotechnology/technology.

3. What currently emerging biotechnologies do you consider have the most important implications ethically, socially and legally?

Of the technologies that I am familiar, synthetic biology and molecular breeding (selection) have very important ethical, social and legal implications. Both technologies are going to be caught in the middle of on-going discussions on sustainable development and technologies used for mitigating climate change as well as promoting the conservation and sustainable use of biodiversity. Because these will use genetic resources and perhaps traditional knowledge as a base, considerations will have to be given to the fair and equitable sharing of the benefit derived from utilization of genetic resources in applications of these emerging technologies.

4. Are there examples where social, cultural and geographical factors have influenced the development of emerging biotechnologies (either in the past or currently)?

Absolutely. Europe's rejection of GM crops on principle is socially and culturally based. It is, in my opinion, completely reasonable to assume that similar factors will affect the development of technologies in the future. The "not invented here" syndrome is very *real* and a frequent hurdle to bringing new technologies to markets that view acceptance as giving other markets a competitive advantage. Europe has spent vast amount of money on biosafety research but little or nothing in development of biotechnology crops. The research mentality has been a regulatory barrier to development.

5. Are there examples where social, cultural and geographical factors have influenced public acceptance or rejection of emerging biotechnologies?

Again, I believe Europe and other world areas are examples where the socially acceptable perception of being “green” has influenced public acceptance of GM technology.

6. Are there examples where internationalisation or globalisation of research, markets and regulation have influenced the development of emerging biotechnologies?

I'm not sure I understand what globalization of research is. The lack of globalization creates a barrier to development because countries can view specialized knowledge held in a particular country as a competitive advantage. Research starts in the mind of an individual or small collection of individuals who will likely keep their knowledge confidential until the time is right to make it public through publication and/or patent. So, to me, truly globalized research and markets are generic and should have little encumbrance to further deployment.

Globalized regulation occurs at the level of international treaties and consensus organizations like OECD. The Convention on Biological Diversity (CBD) and its Cartagena Protocol for Biosafety (CPB) of LMOs was meant to be a tool to enable the safe development of products of modern biotechnology. The language of the CBD and CPB are reasonable, cautionary and integrative of multiple visions for sustainable development. However, more recent negotiations particularly within the CPB have lost the spirit of enablement and are moving toward a more conservative interpretation of precaution (move from the precautionary approach to the precautionary principle), and represents a narrow view of sustainability, one that in its most radical formulation excludes LMOs. I view the negotiations on the CPB as an attempt to globalize the regulation of GM biotechnology, and the discussion is polarized to the point of being unconstructive.

7. How have political traditions (such as liberal democracy) and political conditions (e.g. war) influenced the emergence of biotechnologies?

8. Are there ethical or policy issues that are common to most or many emerging biotechnologies? Are there ethical or policy issues that are specific to emerging biotechnologies? Which of these, if any, are the most important?

Common across emerging biotechnologies is the issue of ownership and the rights of ownership. Can a company or individual "own" or have sufficient control through intellectual property rights to effectively control all access to that technology?

Another common issue is the impact of the technology on poverty eradication. Developers should consider as Gandhi said *"Recall the face of the poorest and the weakest man whom you have seen, and ask yourself, if the steps you contemplate are going to be of any use to him. Will he gain anything by it? Will it restore to him control over his own life and destiny?"* These, to me, are key ethical/policy issue associated with all emerging biotechnologies. Depending on the particular technology, ethical issues like farmers' rights, fair and equitable sharing of benefits from utilization of genetic resources and right to food will be relevant to development.

9. Do you think that some social and ethical themes are commonly overlooked in discussions about emerging biotechnologies? If so, what are they?

I think this depends of the degree of public attention and controversy.

Biotechnologies were developed in France within the cheese industry without any social or ethical discussions compared to the use of GM for crops. As such, the public determines the amount and nature of discourse and ethical discussion on an emerging biotechnology.

10. What evidence is there that ethical, social and policy issues have affected decisions in (i) setting research priorities, (ii) setting priorities for technological development, and (iii) deploying emerging biotechnologies, in either the public or private sector?

One very good example was a decision made by some plant biotech companies years ago to use only genes from bacteria, plants and viruses in GM crops. There was no science-based reason to eschew animal genes except for the belief that the

many in the public perceived this as improper. Another example was “terminator technology”, which despite the fabrications by many (irresponsible) activists has never been pursued by the private sector (though some ecologists have called for it).

11. What ethical principles should be taken into account when considering emerging biotechnologies? Are any of these specific to emerging biotechnologies? Which are the most important?

12. Who should bear responsibility for decision making at each stage of the development of an emerging biotechnology? Is there a clear chain of accountability if a risk of adverse effects is realised?

The first decision-maker must be the individual; a personal decision must be made to pursue development of an emerging biotechnology. Individuals must accept personal accountability for their decisions. The larger body of people associated with decisions should then be accountable to realized risks which may or may not have been foreseeable.

13. What roles have ‘risk’ and ‘precaution’ played in policy decisions concerning emerging biotechnologies?

Risk is ever present while precaution is (to me) the risk management – the measure taken to prevent harmful things from being realized. The absence of clear standards for acceptable risk has created significant challenges for decision-makers.

Precaution has been a term cast with the conversation on GM technologies with a particular context. I view the risk assessment as a precautionary approach – ensuring that no foreseeable and untoward risks are accepted. Precaution in the context GM is both a “no” decision and no decision, which unfortunately neglects the fact that all risks are not being assessed and managed – only the risk of a specific decision.

14. To what extent is it possible or desirable to regulate emerging biotechnologies via a single framework as opposed to individually or in small clusters?

Impossible and probably unnecessary.

15. What role should public opinion play in the development of policy around emerging biotechnologies?

A central role with the caveat that public opinion can be informed or uninformed. Opinions are like faces; everyone has one and each one is unique to the individual. However, I prefer policy set based on input of the electorate.

16. What public engagement activities are, or are not, particularly valuable with respect to emerging biotechnologies? How should we evaluate public engagement activities?

17. Is there something unique about emerging biotechnologies, relative to other complex areas of government policy making, that requires special kinds of public engagement outside the normal democratic channels?

I don't think so. Had cell phones fallen into the quagmire of public dispute that engulfed GM technology, airports would still have banks of pay phones.