

Chapter 10

Conclusions: emerging
biotechnologies and the
public good

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Introduction

- 10.1 The broad nature of our brief has meant that our treatment of the ethical and social issues surrounding emerging biotechnologies is necessarily quite general. We have forsworn consideration of ‘case studies’, trying always to stand back from particular contexts in order to see emerging biotechnologies as part of a bigger picture, one that engages our attitudes towards science and technology as responses to social challenges and as forces shaping social relations and material well-being. Our subject has not been emerging biotechnologies but how we think about emerging biotechnologies, and how this thinking affects and is affected by what biotechnologies emerge. We have therefore ranged widely across intellectual disciplines and explored diverse literatures as our enquiry has demanded. This has produced some unexpected juxtapositions.
- 10.2 Our own approach is deliberately interdisciplinary – as we observed early on, finding the terms of an unbiased and open engagement between different values and interests within different normative frames is the proper subject of an ‘ethics’ of emerging biotechnology governance.⁷⁰⁵ This frame always has to be constructed – it is not already there, waiting to be discovered by a process of abstract reasoning.
- 10.3 In this Report, we began by observing the diversity of our subject matter, that there are almost no features shared in common between biotechnologies. Indeed, because (although not only because) they often come about through the convergence of existing technologies of different kinds, there may be more variation among biotechnologies than between a given biotechnology and non-biological technology. Nevertheless, although we could not clearly define them as a class, we found a way of addressing emerging biotechnologies, as the assembling of knowledges, practices, products and applications, that involved significant ‘biological’ elements. In order to do this we had to refocus our attention on the nature of ‘emerging’ as a process rather than the nature of the biotechnologies that emerge. This led us to identify uncertainty, ambiguity and transformative potential as important features that mark out emerging biotechnologies, and which constitute the problem with which research, policy and commerce must engage.

Our argument for a ‘public ethics’

- 10.4 Before drawing together our conclusions we now summarise the main steps in the argument that we have developed in the course of this Report.
- a) Biotechnologies have the capacity to produce public benefits but also public harms, both direct and indirect, possibly in ways that are transformative (i.e. that transform the horizon of future possibilities, for example, by locking in dependency on particular technologies, perhaps even ones not yet invented). This may involve a deferral of responsibility for tackling the challenges we presently face to a future in which it is assumed more powerful solutions will be available (the ‘biotechnology wager’).
 - b) There is a public interest both in the fact that new biotechnologies emerge and in *which* biotechnologies emerge because (1) they hold potential for benefit and harm (so we want the beneficial ones) and (2) there are always opportunity costs (there are better and worse technologies so we want the *most* beneficial ones; in any case it is unlikely that we can have all of them so some selection is inevitable).

⁷⁰⁵ See paragraph 4.42 above.

- c) This public interest in having beneficial biotechnologies entails that there should be public support for generating as many prospects for achieving this as possible – the commercial sector should not and cannot do this alone. But the public interest is in achieving socially beneficial ends, so their achievement through technology is merely contingent: the options for achieving those ends may be broader than simply new or ‘high’ technology.
- d) In debates about technology options the concepts of ‘benefit’, ‘harm’, ‘better’, ‘poorer’, etc., are ambiguous and the nature and likelihoods of different outcomes arising from biotechnologies uncertain, and frequently contested. Although the discourse on biotechnology is saturated with claims about public benefits in terms of economic and social impacts, and this is encouraged by competition for research funding, these claims are difficult to examine and too rarely interrogated.
- e) Instead, ambiguities tend to be decided by the way in which biotechnology choices are *framed* and uncertainties smoothed over by promissory narratives that significantly play down the complexity and difficulty of realising the imagined benefits. (For example, we observe that policy decisions are often framed by the privileged concept of economic growth, which dominates other types of values, and articulated within models of innovation that downplay real-world contingency.)
- f) This may lead to policy that is both ethically and strategically flawed: *ethically* flawed because to favour particular kinds of response to social objectives on the basis of a limited range of values may actually detract from the optimisation of overall social value; *strategically* flawed because attempts to control the innovation system may actually fail to optimise the benefits explicitly sought.
- g) Rather than pursuing pathways defined in advance by technical elites, or leaving it to the market to produce and select economically successful products (or some hybrid of these) emergence of biotechnologies should be continuously shaped by the environmental conditions of the research and innovation system. And these conditions should not be determined piecemeal but should be established by engagement between diverse interests under terms that orientate them towards the public good. There is a need to cultivate procedural and institutional virtues that encourage this and operational mechanisms to enable it.

Our conclusions and recommendations

- 10.5 Early on in the Report, in Chapter 1, we described the choice of technological trajectories as a process that was subject to significant historical contingency. The technological solutions to human problems that are chosen are not the only ones possible, and may, indeed, not always be the ‘best’ ones. The solution to human and social challenges is seldom a choice between a given technology and nothing, but more usually between a variety of technological and non-technological – or, more likely, mixed – possibilities. The fact that a given technology may appear to be the best or only path available may be a result of the ‘problem’ to which it is a ‘solution’ being framed as a technical problem looking for a technological solution of a certain type. Conversely, it may be a result of undue attention being given to a particular technology so that ‘its’ range of problems appear more pressing or important than another range of problems that do not have such a solution. We observed that the possible pathways for a range of options cannot always be seen clearly in advance, especially where certain preferred technological pathways are assumed to be urgent and without alternatives. We therefore recommended a more circumspect approach in which **commitments to particular technological pathways should be evaluated not only in terms of their expected future impacts but also by comparison to possible alternative pathways; this can help to illuminate obscured assumptions, constraints and mechanisms of the innovation system, and help to identify sites and opportunities for more constructive governance, prioritisation and control** [paragraph 1.18]. This is not to oppose technological innovation, since the alternatives might be other technologies; rather it is to adopt a questioning approach to dominant ways of thinking about technology that we believe may be entrenched by untested or outdated assumptions.

- 10.6 The approach that we propose as a way of putting this into practice in the context of biotechnology research, development and innovation is the ‘public discourse ethics’ that we develop and describe in Chapter 4. This is intended to give public decision making a properly public orientation by opening up the framing of decisions to the full range of understandings and values that are relevant to them. As we say, the task of public discourse ethics is finding the terms of an unbiased and open engagement between relevant positions and interests, so that it is not captured by particular interests or interpretive frames.
- 10.7 One important procedural measure through which the virtues of public discourse ethics may be expressed is ‘public engagement’. Of course the engagement itself can already be framed by certain influential interests, and so the procedure needs to be able to open up the questions to alternative framings. We conclude that there is no single ‘best’ method of public engagement and that the choice of approaches will always involve dilemmas.
- 10.8 Public engagement cannot, however, replace the responsibility that attaches to properly vested and accountable authority, and it should not therefore be constrained by the need to reach unambiguous conclusions. Indeed, the attempt to do so can lead to overstepping its inherent conditionality in the same way that expert scientific advice may overstep its basis in science. This leads us to recommend that **expert deliberation and public engagement exercises should report their conclusions not in the form of simple prescriptive findings but as properly qualified ‘plural and conditional’ advice** [paragraph 5.46].
- 10.9 Although we are critical of the emphasis placed on the contribution of biotechnology to national economic growth we also note that ‘societal challenges’ can be an equally limiting notion if used unreflectively as a focus for technological innovation. Economic growth is not itself a bad thing, although its blind pursuit may obscure other values. On the other hand, if growth were of paramount importance it is not clear that emerging biotechnologies are necessarily among the best ways of pursuing it. Yet merely replacing one precarious vision of the impact of biotechnology (economic prosperity) with another (that it will address urgent health or environmental problems, for example) can still obscure the real opportunity costs, whether these involve different technological approaches or other types of measure altogether. Without public reflection on this, at the very least policies cannot be known to be robust in the face of uncertainty. We therefore conclude that **when framing science policy through societal challenges, a ‘public ethics’ approach should be taken to avoid an overemphasis on technological rather than social solutions to problems with substantial social dimensions** [paragraph 6.37].
- 10.10 We note that competition for funding in recent years has increased the temptation for researchers to speculate about the impact of their research, and to speculate in very particular ways (for example, quantitative economic benefit). We conclude that **public systems for the allocation of research funding should be designed to avoid encouraging researchers to overstep the bounds of their competence when assessing the impacts of their research in non-research contexts** [paragraph 6.46]. Researchers themselves have a responsibility to resist pressure to engage in inflationary cycles of promises and expectations, since this may both mislead policy and result in distrust of science and technology, particularly where their statements inform public discourse on biotechnologies. We conclude that **those engaging in public discourse should not only accept responsibility for the factual accuracy and completeness of information they present but also use their best endeavours to ensure, through their continued participation in this discourse, that it is appropriately qualified and interpreted when represented by others** [paragraph 6.53]. We find, however, that the pressure within the policy process for definitive and unambiguous answers can, as with public engagement, also compromise the integrity of scientific advice to policy makers. When they participate in the public policy process, scientists involved in giving policy advice have a particular responsibility to exercise self-restraint and vigilance to avoid projecting a false sense of ‘scientific certainty’.
- 10.11 Responding to the demands of funding and policy making bureaucracies inevitably means that the representation of research is framed by the rubrics of grant applications and prescribed kinds of social and economic impacts. We find that where there is not an engaged public discourse on science and technology it is possible to lose sight of the public good that

orientates research. We conclude that there should be more room for researchers to assert that their work has public good that goes beyond simple economic benefit. Likewise we conclude that the policy discourse on biotechnology can be limited by the way in which technical advice is obtained and technical 'experts' identified, including a tendency to fall back on established sources. Therefore we recommend that **in all cases in which technical advice is sought by policy makers there should be a demonstrable attempt to avoid sole reliance on a limited range of established experts in particular fields** [paragraph 6.58].

- 10.12 Turning to the formation of research and innovation policy we find that the discourse on policy frequently refers to a number of recurrent assumptions for which there is limited historical evidence. In particular, the dominance of economic values in the framing of research policy privileges arguments that can be made in terms of quantifiable economic impact over the significance of other values. In order to enable a balanced deliberation on normative values, one that can have an appropriate impact on policy, we conclude that **the determination of biotechnology policy should attend explicitly to diverse perspectives and bodies of evidence rather than privileging a single, quantitative frame of evaluation (such as economic costs and benefits, or costs and benefits reduced to economic values)**; this should be the case not only at the 'macro' level of Government policy but also at the 'meso' level of funding bodies and, indeed, at the 'micro' level of research [paragraph 7.32].
- 10.13 We find that the reasons states fund research are more complex than simply that knowledge is a 'public good' that would not be adequately provided by private firms, institutions or agents. The real reasons mix, for example, ideology, national self-image and strategic advantage, with the pursuit of economic growth, but they should be closely examined if policy is to be put on a more robust footing. That is not to say that the public good cannot be promoted by state funding of research and, given the dominance of private interests, such funding might be targeted at research supporting the creation of knowledge available to all that could counterbalance the sometimes aggressive promotion of products and techniques by vested interests.
- 10.14 Despite the uncertainties of emerging biotechnologies and the complexities and contingencies of innovation systems, research policy is ostensibly driven by notions of exploitability. Despite this we find that there is little assessment of the past success of this approach. We conclude, therefore, that **there is a need for serious evaluation and assessment of past research policies, both of Government as a whole and of particular public funding bodies, to understand in what conditions, if any, selective approaches to support for biotechnology are plausible** [paragraph 7.46].
- 10.15 Emerging biotechnologies are subject to significant uncertainties, partly as a consequence of the ignored complexity and contingency of the innovation system, partly due to the sensitivity of technology trajectories to contingent factors, and partly due to the possibility of encountering unanticipated 'hard' constraints. In the light of this we conclude that **policy makers should consider adopting an approach to social objectives that fosters diversity of research approaches, not just within the particular domains of individual funding bodies but across physical and life sciences, and the social sciences, combined with selective conditions of innovation that involve social benefit rather than just market value** [paragraph 7.48]. This approach offers a third way between 'picking winners' (whereby public authorities try to pick the most promising research for funding at an early stage) and leaving the selection of technologies to the market and economic determinants, by bringing additional factors, such as social value, into the set of evolutionary conditions that shape and filter technological trajectories.
- 10.16 Reviewing the sites of policy making and the actors involved, UK research policy appears to be shaped through an engagement between academic, political and industrial actors and framed by shared and persistent, but unexamined, cultural assumptions. Broader engagement does not come early enough in the process or at a high enough level to challenge these assumptions. In accordance with our approach to public ethics we recommend that **research policy should be framed not by received assumptions but through continuous engagement with a broad range of societal interests and with the involvement of social actors who can bring**

understanding of these interests to the joint enterprise of constructing a public frame for research policy decisions [paragraph 7.55].

- 10.17 We have noted throughout our enquiry, the privileging of economic framing of research policy to the neglect of other, important values and the need to rebalance these through a public discourse ethics. One barrier to this is the way in which research policy is concentrated in the Government department orientated towards business (the Department for Business, Innovation and Skills) and therefore much more accessible to business interests than others. This is one area in which we believe some structural reorganisation to be desirable, along the lines originally proposed by Lord Haldane, and therefore recommend that **consideration should be given to bringing Government research policy and funding bodies under a senior minister (i.e. of Cabinet rank) free from departmental responsibilities to ensure that research properly reflects all the objectives of Government, rather than those of a particular department** [paragraph 7.56].
- 10.18 As a bulwark against the framing of Government research policy by the preoccupations of a particular department or sector **there should be a clearly defined, written and published Governmental research policy against which detailed elements of departmental and other public research policies (such as the approach and methods of funding bodies) may be assessed**; this should not be produced, as it was formerly, by the Treasury [paragraph 7.56]. This should, as we have said, incorporate the promotion of diversity in underpinning research and the filtering of applied research and development according to a broad range of values rather than merely economic benefit.
- 10.19 Just as with public engagement, we find that there is no *a priori* ideal system of regulation for emerging biotechnologies, and we recognise that regulatory design always involves dilemmas. Our conclusions are, in general, cautious: emerging biotechnologies may challenge the categories and modes of appraisal on which regulation depends and regulation may be either stifling (being adapted to incumbent technologies) or inapplicable to them. There is no single principle of regulatory design that can anticipate these problems: effective regulation of emerging biotechnologies must co-evolve alongside the technologies within a context created by public ethics.
- 10.20 The commercialisation of emerging biotechnologies depends substantially on protection of intellectual property via the patent system. We conclude, however, that this system fails substantially to optimise the social value from biotechnology innovation and that the field is better suited to public and collaborative systems, rather than market competition. Nevertheless the commercial sector has an important role to play in applied research, development and production of biotechnology products, and measures should be considered to align commercial interests with public good. Greater openness is conducive to this and **innovation should be included in corporate social responsibility reports as a separate, specific issue** [paragraph 9.53].
- 10.21 However, we conclude that more can be done, through intervention in the market, to overcome the failure of markets to maximise social benefit and to align commercial incentives with public good. This may be achieved by separating the rewards that innovators receive for the social value of their innovations from revenue they gain through the market price of the commercial product. Whereas the product, whatever it may be, would then be available at or around the economic cost of production, the value of the public good implied within it would be reflected in a separate payment. Therefore we recommend that **consideration should be given to state interventions in the market for new biotechnologies to secure the social benefits of innovation through direct reward for socially valued innovations** [paragraph 9.56]. In the Report we consider supplementary impact payment schemes as an example of such an approach, based on a comparative assignment of social value that is determined in accordance with the virtues and procedures of public discourse ethics.