Written evidence from Dr Alexandra Freeman (ENB0001)

I have a background in the public understanding of science and evidence communication. I spent 16 years making science and natural history documentaries for the BBC, and 7 years as Executive Director of the Winton Centre for Risk & Evidence Communication at the University of Cambridge. My original degree and doctorate were in biology, but my work since then has concentrated on the trustworthy communication of information and evidence of all types.

I would like to comment on Question 7, point 2:

"What more can the Government do to foster public understanding of engineering biology? Is public acceptability of these technologies a barrier to deployment in the UK?"

I think this also feeds in to Question 6, about the current regulatory framework for engineering biology.

- **Public dialogue and listening to/responding to societal views is vital**

It is easy to fall into thinking 'we just need to explain the science, and then people will agree with us'. This is not true[1].

As individuals, we all have different experiences, priorities and values which means that even when we all agree on facts, we will weight risks and benefits differently and have differing opinions on whether the balance of winners and losers in a policy decision is acceptable to us or not.

Thinking of 'public acceptability' as a 'barrier' that a technology has to overcome, and – worse – that lack of acceptability is the result of ignorance (also that 'the public' are a single unit) can lead to breakdowns in dialogue, understanding and trust.

Perceived risks, benefits and regulation
Everyone weighs up benefits and risks of things to decide whether to do – or support – them or not.

The risks associated with synthetic biology fall into a group of technologies of which the risks naturally feel high (see work by Paul

[1] For more on this, in this specific context, two of the author group of the 2012 *Synthetic Biology Roadmap for the UK* write about it here: https://doi.org/10.1177/0162243919828107, e.g. "*SBRCG discussions also frequently adopted a deficit-model approach to public understanding of science: "the public" was represented as a homogeneous mass that passively accepts or rejects a technology, and rejection was assumed to be based on irrational fears. These ideas have been challenged by decades of STS scholarship.*"

Slovic and others[2]): there are a lot of unknowns, it feels 'unnatural', 'inequitable' (it might lead to high benefits for some and great cost to others, and that benefit/cost distribution is not 'fair'), and people are concerned that they are not able to control their exposure to it (due to a lack of labelling, regulation, or it will be unavoidably present in the environment). This means that the potential benefits, costs, and the regulation need to be clear and agreed to by society. As Paul Slovic puts it: "*Recognition of the subjectivity and value-laden nature of both technical risk assessments and public views has highlighted the need for an approach for addressing risk controversies that focuses upon introducing public participation into both risk assessment and decision making in order to make the process more democratic, improve the relevance and quality of technical analysis, and increase the legitimacy and public acceptance of the resulting decisions.*"

This recognition of the importance of societal consent to risks and policy decisions is vital. And there has been some excellent work done, specifically on public views on the risks and benefits of synthetic and engineering biology, in the UK (as well as in other countries) which I would like to draw the Committee's attention to.

- **2010 public dialogue run by the BBDRC and EPSRC**

https://www.ukri.org/publications/synthetic-biology-public-dialogue/
This in-depth piece of work demonstrates many common themes in the public attitudes to science and technology, and particularly around genetic modification and is, I think, vital reading as it covers so much important ground in detail. The public oversight, dialogue and regulation process for engineering biology must root itself in these insights.

Much of the public's response comes down to the perceived motivations behind the work/technology, and the trust they have in the regulatory environment. As the authors of the report see it, there are seven key themes:

"1. Motivation: why are people doing this?
2. How has it shaped their relationship to society or the world?
3. Who is driving the area?
4. Who are the winners and losers?
5. Disconnection from science and technology.
6. Health and environmental impacts of applications.
7. Lack of transparency concerning emerging problems."

The **first four** of these – the questions – are crucial for the development of trust and for an open dialogue about which aspects of the technology should be pursued, by whom, and how. There was concern expressed

[2] For a summary, see https://doi.org/10.1080/00139157.2016.1112169

during the dialogue that the field should not be controlled by those purely excited by the technical possibilities, or those with a profit motive, and that regulations might be difficult to apply to DIY synthetic biologists or those working globally.

Overall, the exercise found that people considered synthetic biology both exciting and scary, with strong views that it should not be stopped, but that there were major risks involved which meant that regulation and monitoring needed to be appropriate to give safeguards.

The report summarised two applications in particular as drawing different responses from participants:

In medical applications
People perceived there to be potentially great benefits, but were concerned that there was not always as much public discussion of things that didn't go well although there was a good amount of trust in the UK healthcare regulation system. There was also concern about inequity – that only a few patients and big businesses would benefit (globally).

In agri-environmental applications
People focussed mainly on food, and a great deal of concern over 'unnatural' foods – the potential benefits being seen mainly as reduction in price and increased volumes but at a cost to quality and increased food waste. Although people trusted that food was regulated to make it safe (e.g. not giving you poisoning), they thought that profit was a dominant factor and that government regulation did not protect against false claims or other aspects of quality.

Overall, there were general concerns about how possible it is to understand and control the risks of synthetic biology given the resilience and adaptability of living things. This was particularly true for applications where release of organisms was a deliberate part of the strategy.

These findings from the UK are strikingly similar to those from other research in Austria & Germany (https://doi.org/10.1007/s11693-015-9182-x) and the US (https://www.wilsoncenter.org/sites/default/files/media/documents/publication/pollhart_revised_.pdf) where similar themes are drawn out.

- **Consequences for deliberation around and regulation of Engineering Biology**

I think it is imperative for the Committee to reflect the findings of these pieces of work done on public opinions about Engineering biology and:

1. Consider different applications of the technology (e.g. medical, agricultural, energy, environmental) separately, as they each have different risk and benefit profiles.

2. Ask the four key questions framed by the UK public in each case:
    - **Who is driving the area?**
    - **What are their motivations and how do those match with society's needs/the public interest?**
    - **How have these motivations shaped their relationship to the technology and its perceived place in society?**
    - **Who might the winners and losers be of the technology in each case? (Globally, including considerations of equity and legal ownership) What are the potential risks as well as the benefits?**

3. Bear in mind the key concerns raised by the UK public:

    - Speed of development might outpace understanding of risks, and of regulation – particularly given the complexity and unpredictability of natural systems.

    - Concern about the use of sentient creatures (especially the use of synthetic biology in humans, and the creation of fully synthetic life), but also a general need for respect and humility when dealing with all life forms and natural systems.

    - Concern about release of biologically-engineered organisms into the environment (even those that are thought to be 'controlled', e.g. through sterility) due to the risk of unforeseen effects.

    - Concern that scientists may be too driven by 'excitement' at discovery and achievement, and that there is a strong profit-drive, both of which will tend to override ethical and careful decision-making.

    - Concern that applications will answer to the needs of profit-making enterprise rather than social need, and that the results will drive social inequality.

    - Concerns over security (biosecurity), particularly if there is global and unrestricted access to building-blocks.

    - Concern that there will not be enough open and well-informed public dialogue – that risks will be glossed over and that the media will be used by those with a particular agenda.

4. Consider the public's views on regulation:
    - Scientists & industry have too many vested interests to self-regulate: there needs to be a robust and independent regulator.
    - There needs to be strict regulation to prevent people doing 'DIY' synthetic biology.
    - The regulation needs to be transparent to scrutiny by the public and NGOs.
    - Regulation should ensure that research and development is done for 'the right reasons' (in the public interest) not for the needs and interests of those involved in the technology.
    - Regulation should not stifle innovation or put the UK at a global disadvantage.

5. Consider a range of possible ways to ensure that open public dialogue continues as the field develops.
   Firstly, how could the Committee best communicate the questions that they have raised with participants in the enquiry, and their reasons for asking them, as well as the answers given?
   Secondly, how can the dialogue continue during discussion of potential regulation and then into the future?
   This could involve talking to publishers, broadcasters, podcasters and Science Festivals; working with organisations like Sense About Science and the Science Media Centre; ensuring that ethicists, social scientists and evidence communicators are involved in discussions as much as those who work directly in the field; and being very strict about transparency of potential conflicts of interest (professional, personal and financial) in all those who take part in discussions so as to ensure that people can assess the possible motivations of those involved.

07 May 2024