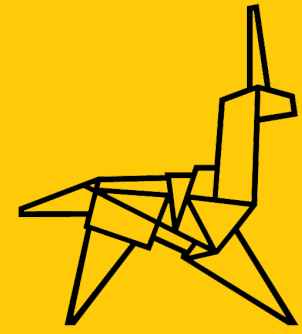


“Sooner or later, someone will create life in the laboratory”

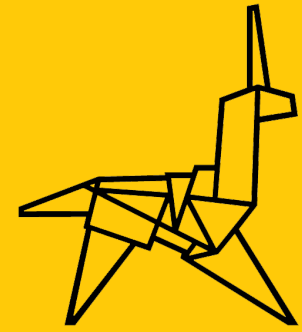
Reflections on developments in synthetic biology and implications for governance

Natalie Partridge ▪ Newcastle University ▪ United Kingdom



Contents

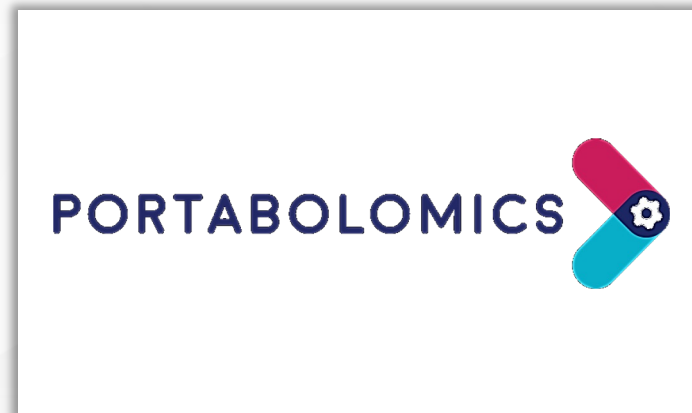
1. Findings of my PhD research
2. Thoughts about conducting exploratory, horizon-scanning research

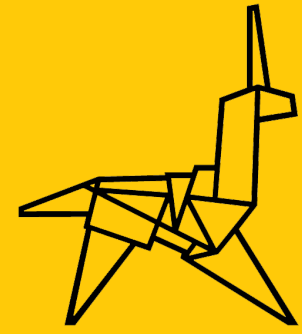


My research

PhD: *Governing synthetic biology: A food policy approach*

With thanks to my supervisors:
Prof. Simon Woods, Dr Ken Taylor





My research



DURATION:

2020-2023



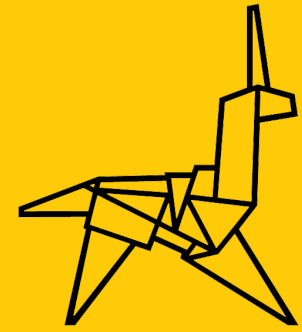
FOCUS:

The implications of
synthetic biology for
UK food policy



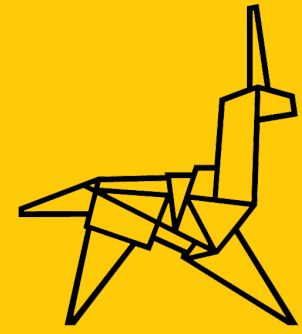
APPROACH:

Exploratory, qualitative
research



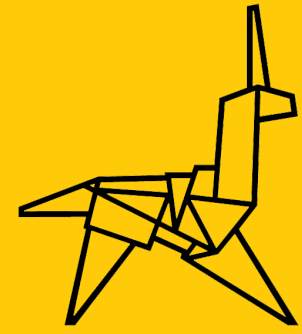
Methods

- 30 semi-structured Zoom interviews with experts from policymaking, synthetic biology, social sciences, industry and non-governmental organisations
- Inductive line-by-line coding in NVivo software
- Thematic analysis



What is synthetic biology?

- Yet to reach a consensus on a definition
- Definition remained elusive in my research
- No agreement on name
- Participants were reluctant, used examples, described it as an approach or mindset, thought it was a rebranding of genetic modification etc.



What is synthetic biology?

Natalie:

So what does the term 'Synthetic Biology' mean to you?

Participant 28 (UK government advisor):

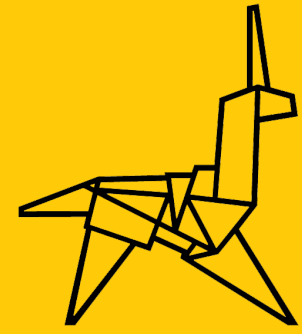
Oh, I knew you were going to ask that. It's such a hard question to answer. (Laughter)

Natalie:

I should have probably asked you at the start, but how would you define synthetic biology?

Participant 30 (Civil servant, UK FSA):

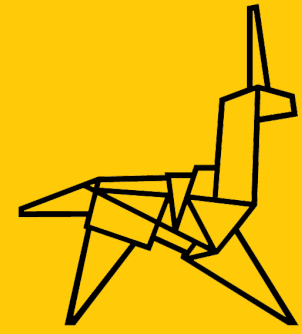
Oh, dear God. (Laughter)



What is synthetic biology?

- Synthetic/engineering biology covers a vast range of work
- Fuzzy, broad spectrum including engineering of organisms e.g. microorganisms, plants, animals, humans – or potentially building novel organisms?

NB: Creating life viewed as a distant possibility, but not unthinkable as technological barriers gradually come down.

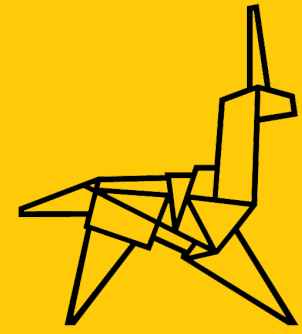


What is synthetic biology?

Participant 7 (Academic scientist, non-UK):

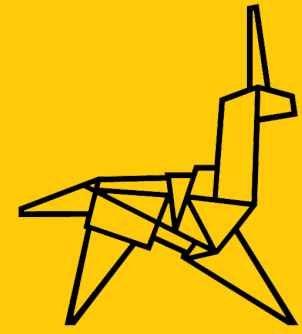
[A]rtificial life is one of the holy grails of synthetic biology. Artificial life is not in sight. In the next ten years no one will be able to create a cell from first principle. I think that if you talk to experts, no one will say we'll have a cell in five years. However, it will happen sooner or later. I mean no question about that, sooner or later someone will create life in the laboratory.

So [do] we wait until that happens or can we start a conversation of how to handle them.



Current policy & the synthetic biology landscape

- Policy landscape fragmented, overcomplicated, time-consuming, difficult to navigate
- Synthetic biology landscape also fragmented with many actors and many roles
- Focus on expertise - “that isn’t something that I do”, others with ‘more’ or ‘better’ expertise



Current policy & the synthetic biology landscape

Natalie:

Do you have any thoughts on current regulation in this area?

Participant 26 (Academic scientist, UK):

No, not really. I mean, I've been avoiding thinking about it, to be honest with you, and just letting other people worry about that.

Natalie

What do you think the food policymakers should focus on in terms of synthetic biology?

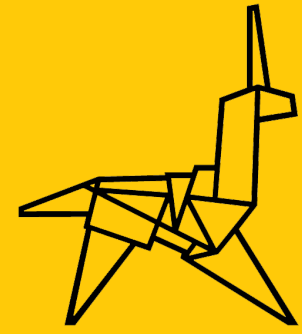
Participant 16 (Regulatory lawyer, UK):

Well, first of all, I'm just a lawyer. I think, as a policymaker, I think I'd focus on actual risks.

[in response to a question about "taking steps down a wrong road"]

Participant 15 (Academic non-scientist, non-UK):

I don't know. I'm just an ethicist. (Laughter)

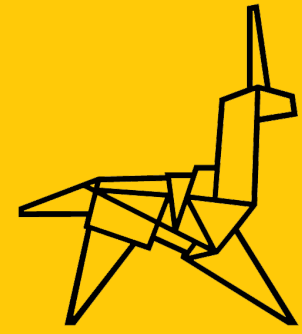


Current policy & the synthetic biology landscape

- Social, ethical, legal implications sometimes the responsibility of social scientists, policymakers, NGOs or publics:

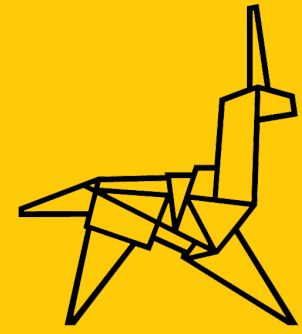
Participant 9 (Scientist, UK & UK government advisor):

[...]how do you actually provide all the information that the public needs, in a form that they can understand? This is probably more your area.



Current policy

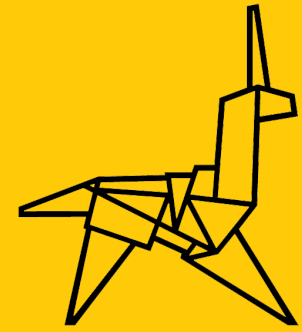
- Governance frameworks “probably strong enough”
- Slow and reactive
- Direction of travel towards incremental change & facilitating scientific progress



Current policy

Participant 28 (UK government advisor):

There's no reason to treat genome engineering any differently from conventional crossing, except to be aware that it's still a process that's relatively new. [...] you want to *keep your finger on the pulse of techniques as they develop*, so you make sure you're using the best available methods for the best available outputs. And I think *as long as your regulatory system allows that to happen, it's good*. I think it's fit for purpose. (Emphasis added)

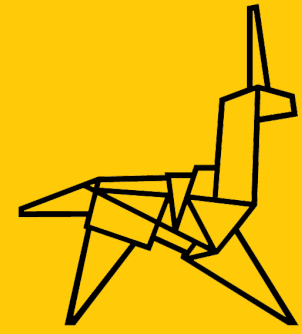


Risk and ethics

- Typically vague and non-specific
- Fundamental science viewed as unproblematic

Participant 12 (UK government advisor):

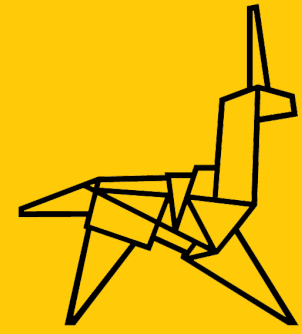
I believe that at a fundamental level, the science itself doesn't [raise ethical questions] because fundamental science doesn't. [...] otherwise you'd say, "Is mathematics ethical?" It starts to get silly.



Imagining future risk

Participant 4 (Academic scientist, UK):

I think we are repeating the same mistake, perhaps not as bad but we are [at] risk of repeating a similar mistake as we did with the lack of responsible innovation with the development of the internet. So, the internet pretty much has been the Wild West and all the technologies associated with and derived from the internet, I'm thinking mostly about social media, AI, and all of these kinds of things. [...] [the synthetic biology community] always had this awareness that this is a radical shift and that we need to be very careful how we go about this.



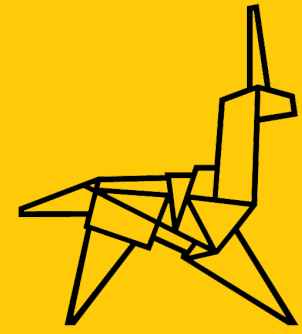
Imagining future risk

- Use of imagined risk objects and imaginary scenarios
- Catastrophising or utopian thinking

[On weighing up risks and benefits]

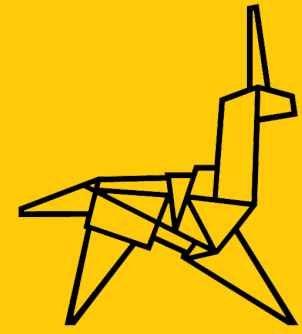
Participant 5 (Academic scientist, non-UK):

To get an answer you need to perform more experiments. For example, I generate a virus, an oncolytic virus. In my lab I see that this virus can cure cancer. It can kill cancer cells. [...] For one, this is great. A lot of profit. Okay. I will save human lives and we can live forever. But since cancer and healthy cells are similar maybe this virus eventually will mutate a little bit and kill us all.



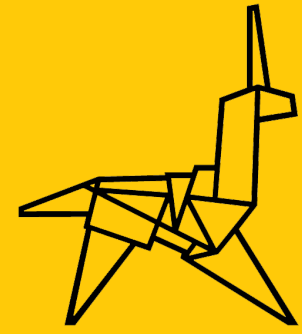
Imagining future risk

- Emphasis on value, importance and power of scientific expertise. Risk assessment by scientific experts and therefore seen as robust.
- Scientists should be “listened to” and have authority in governance decisions
- NGO participants often argued for more research, evidence or expertise, thought risk assessment could be broader or sometimes insufficient



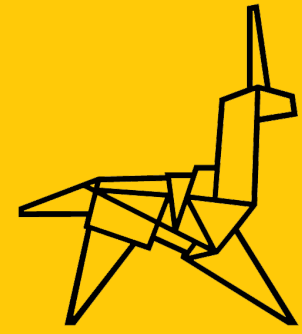
“Other legitimate factors” & intangible risks

- So-called “other legitimate factors” – what might be considered legitimate?
- Perceived disconnect from food and food production
- Perceived risk to the field (something “kills the technology for a decade”), public rejection, synbiophobia-phobia (Marris, 2015)
- Or is risk overstated? Focus on distribution of benefits



Roles of humans

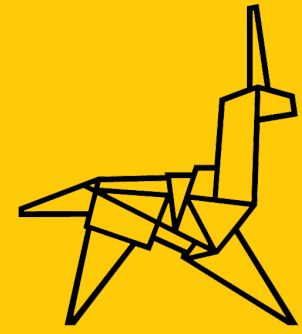
- Humans in more-than-human communities: ecosystems, nature, microorganisms, animals, plants, humans
- Humans as stewards – mitigate harm, safeguarding
- Humans as dominant – optimise, control, design



Roles of humans

Participant 10 (Academic non-scientist, UK)

I think we need to adopt a prima facie duty to allow nature to be, to respect nature's integrity. Of course, we cannot do this totally because, if we just allowed nature to be, we would not be able to exist. So, this prima facie duty to allow nature to be needs to be put into the balance with other duties that we have, such as making sure that we provide enough food for humanity.



On exploratory horizon scanning research

- Questions allowing for imagination

Imagining the futures of a technoscientific field



- Difficult for many participants to imagine the future of synthetic biology
- Tendency to catastrophise or describe utopian visions
- More comfortable imagining non-synthetic biology-related future food and agriculture policy

Imagining the futures of a technoscientific field

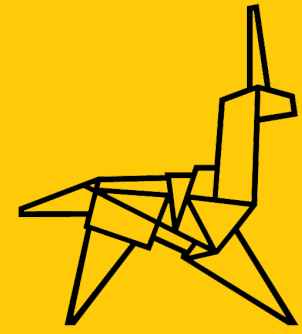


- Often relying on imagined applications
- Focus on potential limits of the technology, technological specifics, scientific knowledge, risk assessment, public (mis-)understandings of science, perceptions of scientific progress and expertise
- Knowledge politics e.g. Stehr, 2005; defining the scope of discussions about risk – see Nelkin, 1987; Kuzma, 2022

Imagining the futures of a technoscientific field

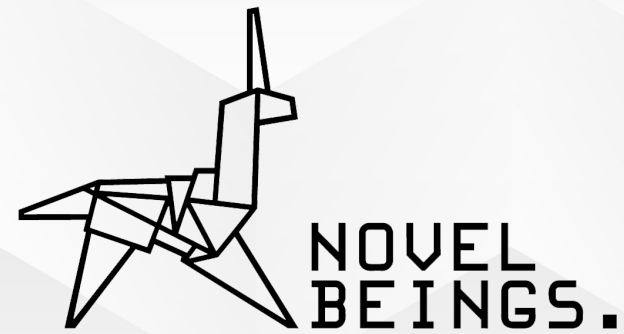


- Retrospection was prominent - experiences of genetic modification controversies
- Characterisations of publics and synthetic biology were often framed by views on GM controversy
- Influenced views on how publics might be communicated with or managed



Conclusion

- Reinforcing importance of technoscientific expertise may exclude or delegitimise broader considerations
- Advisory committees potential sites for deliberation?
- Imagination and horizon scanning led to retrospection and exploration of existing and past barriers and potential opportunities



Thank you for listening!

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