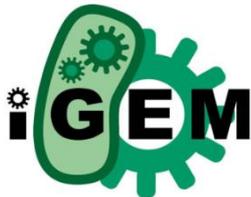




Synthetic biology

Interdisciplinary and inclusive



Synthetic
Aesthetics



International Technology Roadmap for Semiconductors

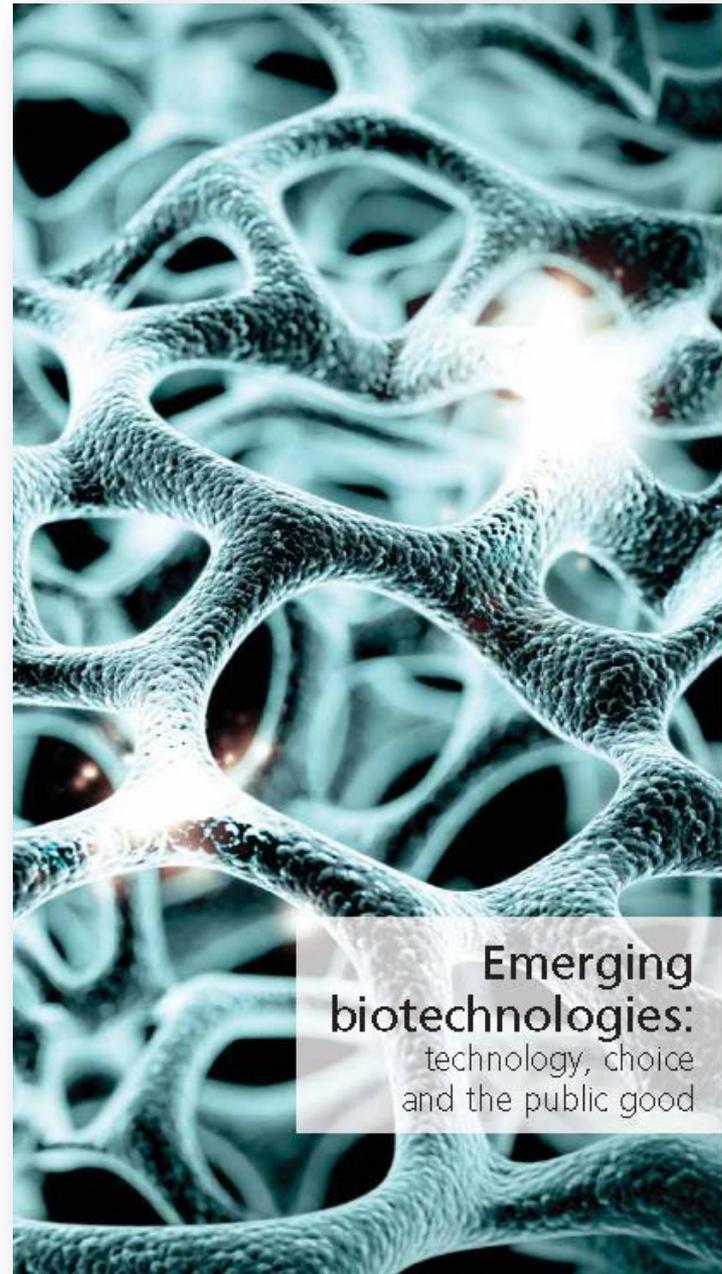
“weave a picture of the future that attempts to galvanise actions in the present”

MacDowall, W. (2012). "Technology roadmaps for transition management"
Technological Forecasting and Social Change 79(3): 530-542.



Uncertainty
Ambiguity
Transformative
potential

Danger of
“lock-in”



**Emerging
biotechnologies:**
technology, choice
and the public good

NUFFIELD
COUNCIL ON
BIOETHICS

Uncertainty

Ambiguity

Transformative
potential

Very difficult to
calculate risks in
advance



**Emerging
biotechnologies:**
technology, choice
and the public good

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COUNCIL ON
BIOETHICS

“Possible risks are endlessly debated, while deeper questions about the values, visions and vested interests that motivate scientific endeavour often remain unasked”

Not just the realm of technical experts

Encouraging the participation of diverse groups in governance

Wilsdon, J. and R. Willis (2004). See-through Science. Why public engagement needs to move upstream. London, DEMOS.

Different ways of seeing the world

“Alternatives are deleted not by argument or by force, but by the circumscribing of imagination itself”



**Emerging
biotechnologies:**
technology, choice
and the public good

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Theme 2:

Continuing responsible research and innovation

It is crucial that this technology continues to be developed in a socially responsible fashion, and that relevant stakeholders, regulators and the public are engaged in research and innovation processes from the outset. Responsible research and innovation encompasses, but is not confined to, operating within an effective risk regulatory framework. The UK needs to be, and to be seen to be, leading the way in frameworks and methodologies for responsible innovation. The UK has already initiated public dialogue in synthetic biology and encouraged interaction between regulators and funders.

fixed preconceptions. The direction taken by innovation pathways, and their perceived social consequences, themselves shape public responses. The responses and decisions of many and varied social groups – alongside those of academic researchers and firms – help to determine technological pathways and the realisation of benefits. These include institutions involved in health, safety and environmental regulation, intellectual property, research funding, and capital investment, as well as intended users and beneficiaries, and civil society groups. New social groups also emerge alongside innovation (new pressure groups may come into being when, for example, a new drug is

To build on this successful dialogue, it is crucial that these questions are at the forefront of ongoing decisions about the commercialisation, translation and regulation of synthetic biology. Indeed, BESRC, on behalf of the UK research councils, posed these questions in the closing session of the Six-Academy Synthetic Biology Symposium II in Shanghai in October 2011¹⁹. Although addressing health, environmental and security risks is important, this will not in itself lead to broad public acceptability unless innovation in synthetic biology is demonstrably directed towards:

- new products, processes and services

“it is essential for debates to go beyond the community of experts to open up discussions about the purpose of innovation”

Unintended consequences

Jobs and growth

Pressure for applications in the short-term

Diverted away from foundational tools and infrastructures?



BIODESIGN FOR THE BIOECONOMY

UK Synthetic Biology
Strategic Plan 2016

“Accelerate
industrialisation and
commercialisation”

Responsible Research and Innovation

Kill switches

Rather than imagining the future of the technology differently

We don't have off-the-shelf tools for constructing collective futures

UK SYNTHETIC BIOLOGY ROADMAP
COORDINATION GROUP

synthetic
biology
roadmap
integrated
for the
UK
sectors
areas
production
chemical
UK

public
systems
sustainable
technology
developing
publicly
energy
medical
approaches
manufacturing
based
safe
chemicals
producing
science
economically
biological
solutions
workforce
societal
scientific
enable
synthetic
platform
fully
scale
production
chemical
benefit
including
comparative
DNA
enable

accepted
therapeutic
industrial
processes
products
applications
range
development
sector
production
chemical
world

one
responsible
organisms
benefits
route
significant
world

technologies
problems
innovative
assembly
public
developing
publicly
energy
medical
approaches
manufacturing
based
safe
chemicals
producing
science
economically
biological
solutions
workforce
societal
scientific
enable
synthetic
platform
fully
scale
production
chemical
benefit
including
comparative
DNA
enable

Synthetic Biology
Leadership Council



BIODESIGN FOR THE BIOECONOMY

UK Synthetic Biology
Strategic Plan 2016

Who is involved?

Those with a stake in the success of the technology will
downplay uncertainties

Incorporate a broader range of people?



“What are the potential roadblocks which will stop synthetic biology becoming industrially successful and how can these be overcome?”

Question

What are the potential roadblocks which will stop synthetic biology becoming industrially successful and how can these be overcome?



