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**ELSI research in SynBio:  
What's being done?  
What should be done?**

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**Session objectives**

1. To briefly review what ELSI is all about and how it might be relevant to SynBio;
2. To inform you about what is already happening in ELSI and SynBio
3. To discuss how YOU think ELSI discussions in SynBio should develop...



**To start...**

- Have you come across any of the broader implications of Synthetic Biology?
  - If so, what sorts of things?
  - Have any of you had any more in-depth discussions about these?
- Do you have 'a feel for' what it is that people working on ELSI issues do?



1. **What is ELSI all about? What does it mean to 'do' ELSI research? How might ELSI be relevant to SynBio?**



### E.L.S.I - ?

ELSI stands for:

- Ethical
  - Legal; and
  - Social
  - Issues
- 
- Established during human genome project; not (yet?) formally adopted for SynBio, although strong interest from funders



### What does ELSI research involve?



- **E** [Ethical]: Examines what a good person would do, or the best possible outcome, or what we have a duty to do. Involves conceptual moral analysis.
- **L** [Legal]: Analyses new issues in light of existing judicial precedent, statutes and regulations – both in UK and abroad. Debates whether law reform is needed
- **S** [Social]: Can involve empirical research (quantitative or qualitative) as well as mapping/tracking debates, research and regulation; eg observational study and analysis



### What is ethics?



- Ethics tries to explain:
  - What **ought** to be done;
    - What is it that makes an action ethically right or wrong? (Not factually right or wrong...)
  - or: What **kind** of person one ought **to be**;
- The methodology of ethics involves:
  - Determining which of several possible courses of action is the most appropriate, by...
  - Making an **ethical argument**, drawing on
    - Theories of ethics and moral judgement
    - Tools of argumentation and reasoning



### Why is this relevant to me?



### How is this relevant to me?

- Synthetic biology will cause concern
  - Need to maintain “public legitimacy and support”; research should not race ahead of public attitudes (Balmer & Martin, 2008)
- Scientists need to take a lead in debating the implications of SynBio (Balmer & Martin)
- Consider how to shape the field and how to become involved in ethical reflection and responsiveness



### How might you consider ELSI in your work?

- Raising your ‘ethics antennae’
  - E.g.: think about how the wider applications or implications of your work might be interpreted
    - (We’ll cover some example issues)
- What could I offer?
  - Be prepared to debate/engage
  - See your work in a broader context
  - Don’t be threatened by ELSI ☺



## 2. What ELSI research is already happening, and where? What issues are arising?

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### Ethics and SynBio

- Tracing the debate so far...
  - Ethics session at each annual SynBio meeting
  - Rapidly increasing academic literature
  - Funding of ethics projects in North America and Europe
  - Some activist interest, eg Friends of the Earth, ETC Group (Canada)

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### Is there anything new here?

- We've so far had...
  - Genethics, Neuroethics, Enviro-Ethics, Nanoethics
  - Does SynBio raise new ethical issues over and above those raised by genetic engineering, or nanotechnology? Does it need its own 'ethics'?
- Some have suggested that 'SynBioEthics' should not be a separate field. Parens (2008)
  - But: this does not mean that there are not issues that need to be debated...
    - And others have argued that something "new and important" is happening (Balmer & Martin)

 University of BRISTOL



[http://ec.europa.eu/european\\_group\\_ethics/index\\_en.htm](http://ec.europa.eu/european_group_ethics/index_en.htm)



<http://www.synthethics.eu>



<http://www.synbiosafe.eu>

The screenshot shows the 'Find a project' page for the SYBHEL project on the FP7 website. The project title is 'Synthetic biology for human health: Ethical and legal issues (SYBHEL)'. It is funded under the 7th Framework Programme. The research area is 'SIS-2008-1.1.2.1 Ethics and new and emerging fields of science and technology'. The coordinator is Vince Boyle from the University of Bristol. The project description states that Synthetic Biology (SynBio) is a relatively new field of scientific endeavour, and SYBHEL will examine several aspects of SynBio as it applies to human health including: philosophical and social considerations of life (including new human-like entities), appropriate methodologies for biosafety analysis in SynBio for

**sybhel-project@bristol.ac.uk**

The screenshot shows the homepage of the Centre for Synthetic Biology and Innovation at Imperial College London. The page includes a navigation menu with links for 'Home', 'People', 'Studying', and 'What's On'. The main content area features a welcome message and a detailed description of the Centre's mission, which is to develop novel approaches to research in biology, medicine and engineering. It also mentions the Centre's focus on developing a vibrant and world-leading research centre in the emerging field of synthetic biology.

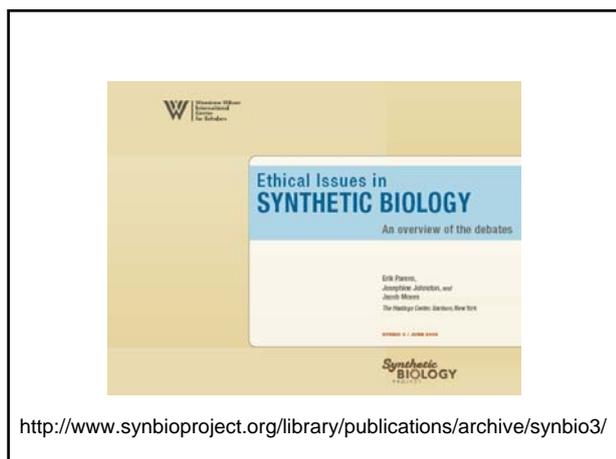
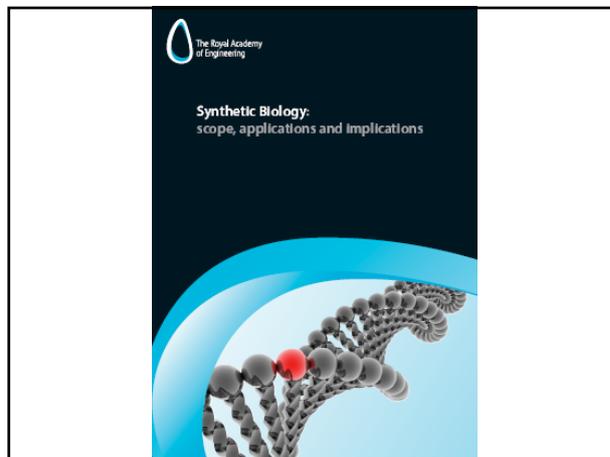
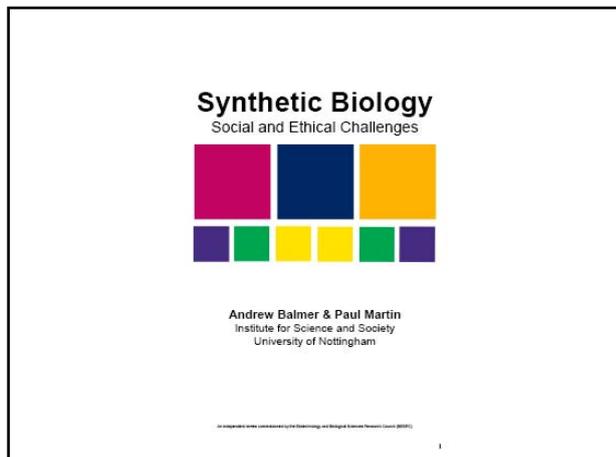
**http://www3.imperial.ac.uk/syntheticbiology**

The screenshot shows the homepage of the Synthetic Biology Project website. The main heading is 'Synthetic BIOLOGY PROJECT' with the tagline 'ensuring benefits are realized through responsible development'. The page features several news items, including 'PROJECT NEWS - 04/10/09 Synthetic Biology Project Receives Two National Science Foundation Grants' and 'SYNBIOSIS NEWS - 02/10/09 Biologists nipping while work militarized'. There is also a section titled 'what is SYNTHETIC BIOLOGY?' with a sub-heading 'Good question! It's building as we speak. We'll give you a bird's eye view of what all the excitement and uncertainty is about.'

**http://www.synbioproject.org**

The screenshot shows the 'Ethical Issues in Synthetic Biology' page on The Hastings Center website. The page is dated January 2009 - December 2010. The principal investigators are Gregory Kaebnick, Thomas H. Murray, and Erik Parens. The funder is The Alfred P. Sloan Foundation. The purpose of the project is to identify, articulate, and critique arguments concerning nonphysical moral concerns in relation to synthetic biology. The project seeks to accomplish four principal goals: 1. Identify, articulate, and critique arguments concerning nonphysical moral concerns in relation to synthetic biology; 2. Examine the philosophical and legal bases for incorporating concerns about nonphysical moral concerns into public discourse.

**http://www.thehastingscenter.org/Research/Detail.aspx?id=1548**



<http://www.synbioproject.org/library/publications/archive/synbio3/>

**Early ELSI issues discussed**

- Benefit sharing & commercialisation
- Safety
- Biosecurity
- How should we define 'life'?
- Benefit sharing, commercialisation and justice
- Most of these will arise at the functional / self-organisation and application stages of SynBio



### More recent issues

- Type of ethical analysis:
  - Specific, or focussing on *all* emerging and converging technologies?
- Distinguishing moral issues from questions of policy
- Scientific integrity
- Framework for going forward: pro-actionary or precautionary? (Woodrow Wilson Centre report, 2009)



### Spotlight: regulation

- Questions arising:
  - Do we need new regulation for SynBio?
    - Differing opinions emerging already...
  - If so, how? Options for regulation:
    - Self-regulation
    - Moratorium
    - Comprehensive legal or regulatory oversight
  - What about specific issues, eg patenting/IP?
    - Eg: Is patenting a minimal genome appropriate?



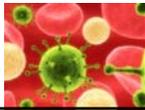
**3. How do YOU think ELSI discussions in SynBio should develop?  
What issues are worth exploring and what might you reject?**

### Why I think ELSI is important!

- Great opportunity to demonstrate 'reflectivity'
- Explores a 'bigger picture' than pure science
- Can be interesting (and fun)
- Allows all involved to develop and hone new skills
- Can lead to new ideas, theories and debates
- Will help promote legitimacy of the field

### Possible limits to debate

- What makes something an 'ELSI' issue?
  - Designated 'non-ELSI' issues may have an ELSI dimension...
- "This is something I've been doing for years... why are you ethicists suddenly so interested in it?"
- We can't even define SynBio; how are we going to discuss ELSI issues?



### A thought experiment...

- Imagine you are on a plane on your way to a SynBio conference. You get chatting to the person next to you about your work. (How might you explain it; what would you emphasise?)
  - What questions/concerns might they raise with you? How would you respond?
  - [How seriously would you take their concerns?]



### Some further questions...

- What lessons do you think SynBio should take on board from the 'Frankenfood' and 'Grey Goo' debates over GM and nanotechnology?
- What ELSI issues do you think might be most relevant/important to SynBio?
- Can you see any relevance of ELSI in your work?
  - If not, could you still get involved in the broader debates/discussions?
- How do you think ELSI should develop within the SCN?



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Thank-you!

