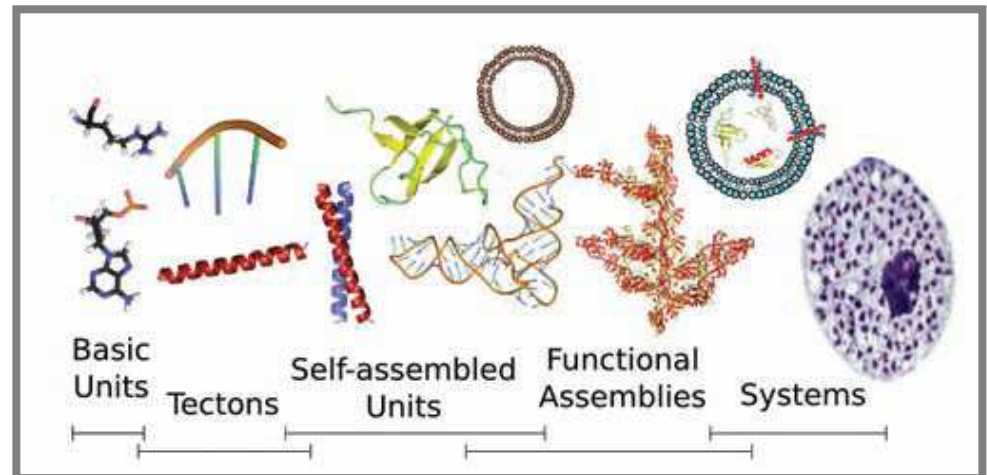


UK Government Approach to Synthetic Biology

Adrian Smith
DG Science and Research

UK Research Framework

- Funding approach is through arm's length agencies
 - Government sets overall funding strategy
 - Funding agencies make detailed decisions on programmes
- Other interested parties:
 - Royal Society
 - Royal Academy of Engineering
 - Wellcome Trust



Bio-molecular toolkit approach - Bristol

UK Research Interests in Synthetic Biology

UK investment in synthetic biology through the Research Councils totals c.£10m plus over £7m in related activities:

- Biotechnology and Biological Sciences Research Council (BBSRC)
 - Engineering and Physical Sciences Research Council (EPSRC)
 - Medical Research Council (MRC)
 - Economic and Social Research Council (EHRC) and Arts and Humanities Research Council (AHRC) are also committed to examining societal and ethical issues
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Networks in Synthetic Biology

The Networks in Synthetic Biology Initiative has invested just under £1m in seven networks in eight institutions

- Research Councils funding to the Networks is aimed at facilitating multidisciplinary working and development of a 'common language' between bioscience and engineering research groups
 - Some Networks are addressing the development of basic 'tool kits'. Others are exploring specific technical challenges and specific potential applications
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Networks in Synthetic Biology

- **Synthetic Components Network: Towards Synthetic Biology From The Bottom Up.** Led by University of Bristol (Professor D. Woolfson)
 - **SPPI-NET: a Network for Synthetic Plant Products for Industry.** Led by Durham University (Professor R. Edwards)
 - **Standards for the Design and Engineering of Modular Biological Devices.** Led by University of Edinburgh (Professor A. Elfick)
 - **The UCL Network in Synthetic Biology.** Led by University College London & Birkbeck College (Professor J. Ward; Dr I. Nobeli)
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Networks in Synthetic Biology

- **A Synthetic Biology Network for Modelling and Programming Cell-Cell Interactions.** Led by University of Nottingham (Professor N. Krasnogor)
 - **From Robust Synthetic Biological Parts to Whole Systems: Theoretical, Practical and Ethical Challenges.** Led by University of Oxford (Professor A. Papachristodolou)
 - **MATEs - Microbial Applications to Tissue Engineering: An Exemplar of Synthetic Biology.** Led by University of Sheffield (Professor P. Wright)
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Centre for Synthetic Biology and Innovation



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- A new and innovative research centre with the aim of establishing a strong research base in synthetic biology, coupled to a full educational and training programme
 - Established within Imperial's Institute of Systems and Synthetic Biology (IoSSB), with close links to LSE's BIOS Centre (centre for research and policy on social aspects of the life sciences and biomedicine) with an award totalling £8m over five years
 - The aim of the centre will be to identify the main challenges that need to be addressed in the field of synthetic biology and establish research clusters involving multiple institutions to tackle these challenges
 - By 2014, the centre is expected to be actively engaged in a rapidly expanding industrial sector in terms of intellectual property, spinout companies and collaborative research
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International collaborations

EPSRC/NSF Joint Call for New Directions in Synthetic Biology

- EPSRC and the US National Science Foundation (NSF), held an interactive five day “sandpit” in Warrenton, VA in April 2009
 - Aim to stimulate thinking in promising areas of synthetic biology, and to fund new collaborations between leading US and UK scientists, and advance research practises from both nations
 - The sandpit was jointly funded by EPSRC and NSF. From 170 applications received, 30 participants were selected
 - Following this event EPSRC and NSF have agreed in principle to follow up activities which facilitate further collaboration between leading US and UK academics
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European Activities

- The EU funds research via the Framework Programmes for Research and Technological Development (FP)
 - New and Emerging Science and Technology (NEST) programme has provided early stage funding for 18 synthetic biology research and policy projects
 - Towards a European Strategy for Synthetic Biology (TESSY), is providing a research roadmap for Europe
 - SYNBIOSAFE, to identify the commercial prospects for EU research and frameworks for funding, ethical oversight, safety and public engagement
 - EMERGENCE, looking at education, infrastructural needs and to standardise various aspects of the research
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UK position on Policy issues

- National Academies (Royal Society and Royal Academy of Engineering) and the Research Councils have recently published documents which help to develop our vision for the future of synthetic biology and review the societal and ethical implications
 - As part of its 2009 activities, the EGE, an advisory board to the European Commission (EC), has been asked by EC President José Manuel Barroso to produce an opinion on the ethics of synthetic biology. This opinion will contribute to the current and future strategies of the EC related to this scientific area
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UK position on Policy issues

UK Government is still exploring the opportunities and implications of the developing practice of synthetic biology

The Government has made a number of recent commitments to develop a scientifically literate workforce:

- Improving our skills and adapting them to the specialist demands of a modern economy
- Strengthening our capabilities in research and development
- Innovating further in science and technology
- Industrialising this innovation in commercially successful ways

New Industries New Jobs

UK Regulatory Framework

In the UK, the main organisations with responsibility in this area are:

- Department for Environment, Food and Rural Affairs (DEFRA) - particularly ACRE - Advisory Committee on Releases to the Environment
- The Health and Safety Executive - particularly SACGM - Scientific Advisory Committee on Genetically Modified Organisms

Official view in the UK is that the majority of synthetic biology research will be covered by current GMO regulations and that there is no need, at present, for any new regulations relating specifically to synthetic biology

Skills

A number of universities are offering PhDs in Synthetic Biology, some are starting to introduce Masters and even undergraduate options

Edinburgh

- MSc in Bioinformatics plus Synthetic Biology starting September 2009
- MSc in Synthetic Biology starting in October 2009
- Post Graduate Summer School on Computational Methods in Synthetic Biology, in conjunction with Heriot-Watt University

Cambridge

- Fourth Year Course in Systems and Synthetic Biology plus plants

Imperial College:

- Final year 12 week module option in Synthetic Biology
- MRes in Systems and Synthetic Biology
- MSc in Bioinformatics and Theoretical Systems Biology

The Imperial College courses have been proposed as a model for the EU

A National Strategy for Synthetic Biology?

- Need to consider what the role of government should be in stimulating activity and driving innovation in Synthetic Biology
 - Need to consider balance of national and international level co-ordination of activities
 - What responsibility should government and its agencies take for policy issues such as security, ethics and public dialogue? Who else has responsibilities?
 - Need to tension investment in Synthetic Biology against competing investment priorities
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