Interdisciplinary research in the biosciences: reflections and opportunities

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BBSRC – what we do

- Invest in **world-class bioscience research** in UK Universities and Institutes
- Invest in **bioscience training and skills** for the next generation of bioscientists
- Drive the widest possible **social and economic impact** from our bioscience in industry, policy and public goods
- Promote **public dialogue** on bioscience
Innovations in Biological Imaging over last decade

2004 QDs label cancer markers

2006 PALM, FPALM and STORM developed

2008 First switchable Quantum Dots

Sept 2010-Aug 2014 QSTORM

May 2014 Kavli Prize in Nanoscience for Super-Resolution Imaging

October 2014 Hell wins the Nobel Prize

January 2015 Expansion Microscopy

Credit: QSTORM Research Timeline
BBSRC support for interdisciplinary research

• Responsive
  – Through standard funding streams
  – Tools and resources development fund

• Strategic initiatives
  – Synthetic Biology
  – Industrial Biotechnology
  – Global food security programme
  – Research Industry Clubs

• Training & people
  – Studentships
  – Flexible interchange programme
  – Community networks
Synthetic Biology

..the design and engineering of biologically based parts, novel devices and systems and redesign of natural biological systems....
Synthetic Biology for Growth Programme

Autumn Statement 2012 provided investment of £50M capital for Synthetic Biology.

1. Multidisciplinary Synthetic Biology Research Centres (£20M) - supplemented by £50M resource funds from BBSRC, EPSRC & MRC

2. UK DNA Synthesis capability to enable rapid large-scale DNA synthesis (£18M)

3. Synthetic Biology Company ‘Seed Fund’ to support SynBio start-up companies and ‘pre-companies’ (£10M)

4. Targeted training of cohorts of students (£2M)
BBSRC Networks in Industrial Biotechnology and Bioenergy (2014-2019)

Biorefining

- LBNet
- FoodWasteNet
- AD NETWORK
- P2P

Bioprocessing

- BioProNET

Novel Chassis

- C1net
- PHYCONET
- NPRONET

HVC/Natural Products

- High Value Chemicals from Plants

Biocatalysis

- biocatnet

Cross Cutting

- IBCarb
- Metals in Biology
- CBMNet

www.bbsrc.ac.uk/bbsrcnibb | nibb@bbsrc.ac.uk
UK bioscience research delivering new products & processes key to the bioeconomy and driving economic growth for the UK and worldwide

BBSRC NIBB

Network Members
- Network Leadership
  - Network Director
  - Network Manager
  - Management Board

Multidisciplinary academics
- Postgrad to professor
- Industry representatives
- International connections

BIVs & Proof of Concept Funds
Administered by Network

Public Engagement

Policy Engagement

IB Catalyst
- Research Council Funding
- Innovate UK Funding
- International Funding

Scale up and Demonstration

Commercialisation

IB Catalyst
- 5 year funding programme
  - BBSRC, EPSRC, Innovate UK
- £45M funding for 2014-15

Seeking funding jointly with Innovate UK and EPSRC

£18M funding for
- 13 networks
  - www.bbsrc.ac.uk/bbsrcnibb

Public Engagement

Vision

£45M funding for 2014-15

International Funding

£18M funding for 13 networks

www.bbsrc.ac.uk/bbsrcnibb
BBSRC FLIP Flexible Interchange Programme

- people movement between different environments
- and must lead to the exchange of knowledge / technology / skills

Academic Lead

Must link to BBSRC-funded project

Charitable sector

- e.g. to influence current/future thinking

Policy-making sector

- e.g. to enable successful application of the outcomes of BBSRC-funded research

Industrial sector

- e.g. pharmaceuticals, biotechnology, food & drink, engineering, chemicals, IT, etc.

New interdisciplinary research

- e.g. expansion of mathematical and/or engineering skills by a biologist

Professional services – Technology Transfer

www.bbsrc.ac.uk/FLIP

Application deadline: apply anytime
Assessment: next available Committee E meeting
Support for: ~ 6 – 24 months ~ £50 – 150 K
Personal reflections

BBSRC/EPSRC/MRC Stem cell science and engineering initiative

- Worked with engineers on challenges of scale-up of embryonic stem cells (mouse and human)
- Cultural differences between disciplines
- Technical language
- Importance of respecting each others views and approaches
- Be willing to question
- Importance of relationships – being able to work together & build trust
Successful interdisciplinary research in the Biosciences

- Motivated by the biological research question or challenge
- Novel discovery opportunities for all involved
- Co-design of the research programme
- Based on making common cause in equal partnership – and not one discipline acting as a service to another
- Learning to speak each other’s language
- Being prepared to not be an expert in all aspects
Challenges

- Environment and organisational culture
- Reward and recognition
- Training
Future Opportunities

• Frontier Bioscience
  – Interdisciplinary research at the frontiers

• Animal and Plant Health
  – Sensors, autonomous systems, data integration, IoAT

• Imaging and related technologies
  – Integration of photonics and biological applications to deliver improved spatial and temporal resolution
  – Multi-modal imaging
  – Integration with other techniques e.g. single cell sequencing, proteomic profiling of cells and tissues