

Strategic Research Initiatives at the University of Cambridge

First-year Report – November 2014

Synthetic Biology

<http://www.synbio.cam.ac.uk>

Achievements

1. What has been achieved over the past year that would not have happened without Strategic Initiative status?

- (i) A cross-school management board was established and first met on 27th January 2014. The Synthetic Biology Strategic Research Initiative aims to promote interdisciplinary exchange between Biology, Engineering and the Physical Sciences - and to fund new mechanisms for collaboration across disciplines.
- (ii) SRI has allowed the establishment and funding an informal venue for monthly meetings (Cafe Synthetique at the Panton Arms) and these have proved very successful as a venue for interdisciplinary exchange. We have setup a website at <http://www.meetup.com/Cambridge-Synthetic-Biology-Meetup/> to publicise the event and provide a point of exchange, with currently a core of around 120 registered users.
- (iii) The meetings have provided a forum for a range of interdisciplinary activities, including:
 - (a) the first Cambridge Open Technology workshop to promote open technologies across engineering, computing, physics, biology. This was held at CUED on June 20th (<http://openlabtools.eng.cam.ac.uk/events/>)
 - (b) the Cambridge undergraduate team for the international iGEM2014 Synthetic Biology competition
 - (c) the OpenLabTools undergraduate team working on bioinstrumentation with Dr. Alexandre Kabla in CUED.
- (iv) A web resource for synthetic biology has been established at www.synbio.cam.ac.uk - based on a highly ranked website at www.synbio.org.uk, which has been running since 2006.
- (v) Cambridge partnered and co-organised an ERA-SynBio Summer School in Synthetic Biology, that was held at the JIC, Norwich in Sept 14th-20th.
- (vi) The SRI has sponsored the assembly of a draft common syntax for the construction and distribution of eukaryote gene parts - based on existing standards, with a planned published manifesto and a community workshop in Boston at the global iGEM Jamboree. This effort involves scientific groups in Cambridge (especially those of Haseloff, Hibberd, Smith, Schornack and Baulcombe) and collaboration with the main international groups using Golden Gate, Golden Braid, ENSA and MoClo DNA assembly variants (Patron, Orzaez, Oldroyd, Marillonnet, Warzecha), in order to propagate a common syntax for future work. This is a major achievement.
- (vii) As an extension of this development, we are collaborating with the BioBricks Foundation (www.bbf.org) to establish new working practices in Cambridge to promote innovation and sharing of low-level DNA parts in the field. We are adapting and drafting UK public agreements for new forms of IP-free sharing across the field. This part of the initiative is ongoing and draws strongly on local and international collaborations with social scientists, IP experts and policy makers.
- (viii) With SRI support, we have established a new student and postdoc association (EUSynBioS), with representation across Europe - including faculty as an advisory body. This has been initiated by Christian Boehm, who has a dual role as the European representative for the US-based, NSF-funded Synberc Student & Post-Doc Association. There has been strong support for this across Europe, and we have recruited senior advisors (Haseloff (Cambridge), Ellis (Imperial), Patron (TSL, Norwich), Elfick (Edinburgh), Brown (Synbio KTN), Papachrisodoulou (Oxford), Landrain (Paris), Warzecha (Dortmund), Martins dos Santos (Wageningen), de Lorenzo (Madrid), Linderberg-Moller (Copenhagen), Wiltschi (Freiberg), Kuipers (Groningen), Faulon (Evry), Forster (Lund), Lindner (Paris), Mansy (Trento), Lartigue (Bordeaux), Siewers (Gothenberg) and Jerala (Ljubljana). Further, student and post-doc members have been

recruited from across Europe. We plan to apply for RCUK and EC support for communication, travel and meetings – more details of the initiative are at www.eusynbios.org

2. Are there funding applications, awards or external partnership developments that can be attributed to or have been supported by the Initiative?

- (i) The University of Cambridge was awarded a £12M BBSRC-EPSRC Synthetic Biology Research Centre (OpenPlant) in partnership with the John Innes Centre and The Sainsbury Laboratory, Norwich.
- (ii) The OpenPlant initiative started in September 2014, runs for 5 years, and includes direct funding for 13 PIs in Cambridge working in a wide range of microbial and plant systems. Namely: PDRAs in the groups of Prof. David Baulcombe, Dr. Jim Haseloff, Dr. Jim Ajioka, Prof. Paul Dupree, Dr. Jill Harrison, Prof. Julian Hibberd, Dr. James Locke, Prof. Alex Webb, Prof. Alison Smith, Dr. Sebastian Schornack, Prof. Lisa Hall, Dr. Pietro Cicuta and Prof. Chris Howe.
- (iii) The addition of resources from the OpenPlant initiative is allowing us to extend the SRI funding, and appoint a full time coordinator to promote Synthetic Biology in the University. The appointment of the coordinator has been delayed due to the later than anticipated start of the OpenPlant funding (shifted from Jan 1st 2014 to Sept 3rd 2014 due to delays out of our control). We have excellent candidates for the position.
- (iv) The SRI plans include a micro-fund for interdisciplinary student and PDRA projects (£30K pa). We have managed to quadruple this (to £130K pa with OpenPlant support). The first funding call for the SRI is planned for December 2014.
- (v) The SRI/OpenPlant calls will be aligned with an international Open Technology festival and exhibition that is scheduled for summer 2015, and is being coordinated in Cambridge by a range of cross-discipline groups interested in fostering innovation. The SRI will pay a key role, focusing on the development of synthetic gene systems and bioinstrumentation.
- (vi) Also – see in Section 1 above. The SRI has contributed to interdisciplinary interactions in Cambridge, especially in the development of new inter-School interactions in Open Technologies through Café Synthétique and associated events. We see this as a major strength and opportunity for the SRI, and where the now expanded micro-funding programme will have a major impact.

Context

3. Have changes emerged in the external environment that affect the Initiative? (e.g. new competitors, funding opportunities or risks)

With the award of the OpenPlant grant, Cambridge has established an internationally recognised lead in plant synthetic biology. Funding in this area in the US has been distorted by a focus on biofuel development and defense-related projects managed by DARPA. European investment has been hamstrung by precautionary GM regulations and timid public investment in related technologies. Thus the position for plant synthetic biology has improved dramatically over the year in Cambridge. The resources provided by the joint SRI and OpenPlant initiatives will also provide new opportunities for microbial and animal cell synthetic biology in Cambridge, and we have plans to propagate these new technologies and standards as part of the ongoing micro-funding and outreach activities.

4. What have been the barriers to progressing your objectives?

Our progress towards objectives related to communication, interdisciplinary exchange, international engagement and fund raising have progressed well. We are running behind schedule in spending money! The only two major items for funding are (i) the appointment of a part-time coordinator, and (ii) setup of a £30Kpa fund for interdisciplinary micro-funding. These are important activities for field in Cambridge. Therefore we have been very keen to expand these resources. With the announcement of the OpenPlant award, we planned to match resources for the coordination effort, and establish a full-time (rather than half-time) coordinator. Further OpenPlant funding allows us to effectively quadruple

the resources available for microfunding (to £130Kpa). However, our main barrier to this has been a delay in the start date for the OpenPlant funding, which shifted from Jan 1st 2014 to Sept 3rd 2014 due to constraints at BIS and the Research Councils. This has delayed the establishment and advertising of the full-time post, and first call for micro-funding, but these are now well under way.

5. What support have you received from the Schools and from University offices (e.g. Development Office, Communications Office, Research Strategy Office, International Strategy Office)?

We have received support from the offices of Research Strategy (direct support for the SRI) and Communications (print and web publications) – the question prompts whether we're fully aware of, and using to the full extent the services of these and the other offices. This is something that we will follow up with the appointment of the new coordinator.

Use of Strategic Fund award

6. How have you used the funding awarded from the Administered Fund (£50k per annum) and what value has this brought?

We are running behind schedule in our planned expenditure for the two major items for funding: (i) the appointment of a part-time coordinator, and (ii) setup of a £30Kpa fund for interdisciplinary micro-funding, both of which have been delayed with the late start of the BBSRC-EPSC OpenPlant Synthetic Biology Research Centre, and the coordination of added resources. However, we have the coordinator position now graded and advertised, with excellent candidates in hand. Similarly, the combined micro-funding scheme is underway.

7. Please provide a summary table of expenditure to date (Nov 2013 – Oct 2014).

	£
Café Synthetique	2000
Web resources	2000
Total	4000

Plans

8. What are your plans for the next 12 months?

- (i) Appoint full-time coordinator, with additional OpenPlant contribution.
- (ii) Continue Café Synthetique monthly meetings.
- (iii) Advertise first call for micro-funding round (£65K in the first round), deadline for call in December, to be awarded in January.
- (iv) Second call for micro-funding (£130K), deadline and award in summer 2015.
- (v) There are a number of Open Technology events being coordinated over the last two weeks of July 2015 in Cambridge – turning into a major event or festival, with parallel events planned internationally. We aim to use this to promote opportunities for interdisciplinary work around synthetic biology.
- (vi) We have been in contact with the BBSRC, about the prospect of applying for major new funds for DNA synthesis and distribution of DNA parts following the new common syntax that we are developing. We will pursue this, and explore opportunities for promoting it more widely for microbial and animal work
- (vii) We are exploring the establishment of a multi-site, single page web format for hosting and publicising the multiple projects that will be funded under this initiative.
- (viii) We are continuing to explore the development and implementation of agreements for IP-free sharing of DNA parts.
- (ix) We will highlight a number of new funding initiatives that offer opportunities for synthetic biology.

Steering Committee

Name	Faculty/Department	School
Dr. Jim Haseloff (Chair)	Plant Sciences	SBS
Prof. Sir David Baulcombe	Plant Sciences	SBS
Prof. Peter Leadlay	Biochemistry	SBS
Dr. Jim Ajioka	Pathology	SBS
Prof. Jeremy Baumberg	Nanophotonics	SPS
Dr. Pietro Cicutà	Physics	SPS
Dr. Chris Forman	Chemistry	SPS
Prof. Bill Adams	Geography	SPS
Prof. Lisa Hall	Chemical Engineering & Biotech	ST
Dr. Alexandre Kabla	Engineering	ST
Dr Robert Mullins	Computer Laboratory	ST
Dr. Robert Doubleday	Centre for Science and Policy	ST
Andrew Phillips	Microsoft Research Cambridge	

* Schools: SAH, SHSS, SBS, SCM, SPS, ST