

SRI award 2013–2019 ; IRC commenced October 2019
Maximum length: 6 pages including Annex

Achievements

1. How has the IRC developed its strategy in 2022/23? What are its key achievements?

1. Events

Over the past year, the IRC has organised a range of events including: (1) three EngBio Forums in January, May and November, which bring to our community cutting edge technology and high-profile speakers, most notably Nobel Prize winner: Prof Stefan Hell. The Forums have become the prime Engineering Biology events in Cambridge. During 2023, they attracted over 400 people including academics from different career stages across 42 Cambridge departments and institutes, 52 external educational organisations and industry representatives from 37 companies including Nuclera, Zeiss, Leica and AstraZeneca; (2) monthly Cafe Synthetique events provided an informal space for discussion with a mix of academic and industry speakers and interaction with members of the community within and outside the university. This is a very popular event with a diverse audience of around 250 people in 2023; (3) monthly EngBio Early Career Researchers (ECRs) Meet and Greet. These meetings provided an opportunity for interdisciplinary exchange for postdocs and postgrads. In 2023, it attracted ECRs from 20 different departments and institutions; (4) a grant writing workshop to support ECRs in applying for research funding. The workshop was attended by 24 ECRs from across the University and received very good feedback.

2. Communication

The IRC is keen on maintaining strong communication channels to the wider EngBio Community. In addition to its regular channels (the EngBio website, monthly newsletter, mailing list, and X/Twitter), the IRC is aiming to widen its impact and enhance its outreach through the following: (1) establishing a Communication Subcommittee to plan and oversee communications; (2) developing our communication strategy; (3) expanding to new social media platforms including Slack for ERCs and LinkedIn to increase our visibility to industry; (4) enhancing the EngBio website by developing content which reflects its achievements and contributions to research, in addition to making it more accessible and user friendly. Since July 2023 the IRC website has had over 11,000 visitors and our monthly newsletter is received by an audience of almost 600.

3. Policy

- A CSaP Policy Workshop on Engineering Biology was held at Sidney Sussex College on the 19th of June. It was attended by members of our steering committee (Jim Haseloff (Plant Sciences), Laura Machesky (Biochemistry and Co-Chair IRC, Robert Doubleday (Chair and Director of CSaP), Lalitha Sundaram (CSaP)) and various representatives of government policy as well as UKRI- e.g. Hannah Boardman, Director, Technology and Innovative Regulation, DSIT; Susie Kitchens, Mark Renfrew- also DSIT, Dr Ian Lewis, Head of Transformative Technologies, Biotechnology and Biological Sciences Research Council (BBSRC), UK Research and Innovation. A discussion was held in round table format about the future of Engineering Biology in the UK and the current Roadmap, produced by Richard Kitney Professor of Biomedical Systems Engineering; Chairman of the Institute of Systems and Synthetic Biology; and Co-Director of the EPSRC National Centre for Synthetic Biology and Innovation, Imperial College London. This was an excellent chance for the IRC to contribute to policy in Engineering Biology and to learn about future plans and initiatives.
- The IRC made a collective response to the UK government's Engineering Biology Call for Evidence.¹ We organised a group call with our steering board feeding in at all levels- e.g. from early career to senior members- we brought together the ideas and thoughts of 14 members of the steering board - spanning the departments of Biochemistry, Chemistry, Chemical

¹ [Engineering biology: call for evidence](#). Department for Science, Innovation and Technology. (2023)

Engineering, Plant Sciences, MRC Toxicology Unit, Pharmacology, Kavli Centre for Ethics, Centre for Study of Existential Risk, and Helene Steiner, founder of Open Cell contribute to this call for evidence with both written and oral feedback.

4. Publication and dissemination

EngBio IRC brings together skillful, talented and high-profile researchers who contribute to shaping the UK Engineering Biology research scene. The IRC is working to improve its website to better highlight and share the wealth of research taking place at Cambridge in this area. Additionally in 2023, a grant from the HEIF fund has allowed us to conduct and publish research on existing open technologies in Cambridge and their impact. We were able to support an ECR to conduct interviews with researchers and developers of 16 open technologies and write a report profiling each case. This work has been published as a high quality printed brochure (250 copies printed), in [digital format](#) (20 downloads since September 2023), and as an [interactive website](#) (616 visitors in 7 months). The website will become a living document, with flexibility to update existing projects and add new open technologies as they emerge.

5. Supporting research-led activities

In 2023 the IRC has provided support for a broad range of research-led activities:

- Supporting ECRs to run their own activities through (i) a small grants fund which allows ECRs to organise events independently, (ii) transitioning the ECR Meet and Greet to a fully research-led activity (since September 2023) (iii) providing the ECR committee annual funds of around £3k to organise additional events and manage their own budget
- Offering four open technologies seedfund awards to Cambridge based academics
- Providing funding for the regular meetings and events of Biomaker, NoCaSS and SuperBug groups (researcher-led initiatives in the fields of DIY biology, plant synthetic biology and synthetic and systems biology approaches to microbiology).
- Holding a grant-writing workshop for early career researchers (see above)

6. Cross-sectoral Collaboration

The IRC is continuously seeking to establish and maintain connections with industry. In 2023, the IRC decided to structure its efforts. It has formulated an Industry Partnership Plan, which is composed of two phases and is expected to be implemented between 2023-2026. The implementation commenced in 2023 by drafting an EngBio Tiered Sponsorship Scheme and composing an industry directory/database. After finalising the communication strategy, improving the website and expanding the IRC's social media presence, the EngBio Tiered Sponsorship Scheme will be announced and contacts will be approached to take part in the scheme.

7. Funding Raising

Since its establishment, the IRC has been repeatedly successful in bringing external funding into the university, most notably in the establishment of OpenPlant, one of the UK's six National Synthetic Biology Research Centres (SBRCs). In 2023, The IRC has supported its members to apply for a variety of funding schemes, including major UKRI funds. LM has led a team of academics, including four members of the IRC Steering Committee and academics from four other universities: University of Cambridge, Edinburgh, Glasgow and King's College London to apply for a £13 million UKRI grant to establish an Engineering Biology Mission Hub. At least seven steering committee members applied for the UKRI Engineering Biology Mission Awards. Additionally, the IRC was awarded £10,000 from HEIF's Impact and KE fund and received £1000 from Cambridge Consultants as industry sponsorship for Cafe Synthetique.

8. Internal governance:

The EngBio leadership team (co-chairs and coordinator) has been working over 2023 to ensure that the IRC is collaboratively run by its EngBio community, specifically the steering committee members. In June, we organised a Steering Committee retreat which brought the members together to thoroughly discuss the role of the IRC. The retreat and other consultations have resulted in the following decisions:

- Composing a series of subcommittees to meet more regularly than the steering committee and help push forward key areas of interest. This will include a strategy board, events & communications committee, ECR committees, an external partnerships committee and a working group to explore the possibility of establishing a physical centre for Engineering Biology at the University.

- Recruiting new steering committee members
- Developing terms of reference (ToRs) for the members with a defined serving term
- Convening the Advisory board

9. Monitoring and Evaluation

In order to monitor and evaluate the impact of the IRC, we have started (1) systematically archiving the sign up sheets to our events; (2) gradually introducing short evaluation forms for the participants and audience of our different events; and (3) using this material to feed into a monitoring and evaluation M&E framework.

Context

2. What are Cambridge's key strengths in this area in comparison with other leading institutions nationally and internationally? Over the past year, what challenges and opportunities have emerged in the external environment that may affect the IRC?

Cambridge continues to develop an internationally recognised lead in i) synthetic biology, ii) development of open tools and technologies and iii) capacity building and global collaborations. However, we recognise that centres in Edinburgh and Imperial College have a much greater critical mass of faculty in these areas and they have physical centres with infrastructure to support synthetic and engineering biology. However, we are in a strong position to build international relationships and raise the profile of the University, both nationally and internationally as a hub for excellence in Engineering Biology and responsible innovation.

Most Cambridge research activity is foundational and focused on developing knowledge and enabling technologies. A major role of the IRC is identifying partnerships to take advantage of these translational funds but also looking outside UK government funding to international public and philanthropic opportunities.

Key Strengths of Cambridge In Engineering Biology:

1. Cambridge has a strong albeit dispersed (among sites and departments) interest in Engineering Biology, ranging from synthetic biology to bio-engineering and using rigorous engineering and physical principles to study biology. The IRC has brought this community together and allowed us to discover each other and synergise our research interests.
2. The IRC has given us visibility as an emerging centre of Engineering Biology, both nationally and internationally, leading to an enhanced ability to recruit the best faculty and opportunities to recruit students interested in these areas.
3. Our IRC benefits from a strong involvement of the social sciences and policy, with Robert Doubleday (CSAP) and Richard Milne (Kavli) taking a strong interest in involving scientists in relevant and forward-looking opportunities to influence policy, address ethical concerns and reach out to the public.
4. Cambridge has a vibrant biotech industry, which we are keen engage with (see strategy)

Key Opportunities:

In 2023, government and national-level support for Engineering Biology has gained momentum. The IRC is well positioned to advantage of several new opportunities including:

1. Engineering Biology was announced as one of the five top priorities for UK research by the Department for Science Innovation and Technology in its recently published Science and Technology Framework², which outlines UK science strategy and goals to achieve by 2030.
2. The Council for Science and Technology published a letter to the Prime Minister³ and a report on engineering biology: opportunities for the UK economy and national goals⁴.

² [The UK Science and Technology Framework: taking a systems approach to UK science and technology](#). Department for Science, Innovation and Technology. (2023)

³ [Letter to the Prime Minister on engineering biology](#). Prime Minister's Council for Science and Technology. (2023)

⁴ [Report on engineering biology: opportunities for the UK economy and national goals](#). Prime Minister's Council for Science and Technology. (2023)

3. The Department for Science Innovation and Technology ran a call for evidence⁵ to help decide where it can best support engineering biology in the UK. Co-Chairs Laura Machesky and Jenny Molloy led a team of fourteen members of the steering committee to respond.
4. UKRI's National Engineering Biology Programme (NEBP) released its Engineering Biology Missions Hubs and Mission Awards with a total fund of £73.6 million. Co-Chair Laura Machesky led a team of academics to apply for £13 million to establish an Engineering Biology Mission Hub, and at least seven steering committee members applied for Mission Awards (up to £1.9 million each).
5. Following increased attention at national level several University departments, including the Department of Plant Sciences, Department of Physics and the Department of Biochemistry, are currently making UTO appointments in the areas of Engineering Biology/Synthetic Biology/Biotechnology.

Key Challenges:

1. Our major national and international competitors continue to expand their investment in biological engineering with strong institutional support in terms of new appointments and infrastructure, usually led from the Engineering schools and faculties. We continue to work towards better integration of Biology and Engineering in Cambridge.
2. We lack a shared space for interdisciplinary work, which would enable more sharing across disciplines
3. The University structure makes it challenging to imagine how we could teach in a more interdisciplinary way. We can envisage that it would be beneficial e.g. to have a course in Synthetic Biology, Biophysics, Bioengineering, but this would by nature need to be across several departments and might involve students taking modules in biology, computational science, mathematics, physics, chemistry. This is possible in US universities, but in the UK it is a particular challenge due to the structures of departments.
4. Engaging with industry requires a combination of connections and some real value that we can offer to companies. It is difficult to gauge what would add value and bring more industries on board to support the IRC and interdisciplinary activities in Cambridge. We have begun a dialogue with some local companies and our Open Technologies workshops attracted a number of interested industry partners.
5. We need to think how to enable our members to take better advantage of funding opportunities- e.g. through grant writing workshops, assistance in grant writing and/or someone to scan the horizons and help to bring together people and ideas that could result in more major funding bids and a higher success rate.

Plans

3. What are your plans for 2023-2024?

In 2023-2024 we plan to build on the strengths and successes of the current IRC, including open tools and technologies, capacity building and global collaborations. The IRC's strategy for the next four years aims to position the Cambridge community to best take advantage of upcoming opportunities such as the National Engineering Biology Programme. Our 4-year strategy set out in 2022 established three key areas of focus:

1. Fundraising
2. Support for researcher-led activities
3. Application-inspired research and translation to impact

Over the next twelve months, core activities which will help us achieve these goals include:

1. Expanding Financial Support for IRC Activities & Strengthen Relationships with Industry

Over the next 12 months the IRC plans to strengthen our existing relationships and build new relationships with both local industry (synthetic biology/biotech start-ups and SMEs) and large established industry partners. This will include i) encouraging industry contacts to attend to present at our regular meetings, specifically Cafe Synthetique and as demonstrators at the Engineering Biology

⁵ [Engineering biology: call for evidence](#). Department for Science, Innovation and Technology. (2023)

Forums; ii) establishment of an external partnerships committee to steer interactions with industry and other stakeholders; iii) establishment of a communications strategy including an update of the IRC website and directory and establishment of IRC 'Research Themes' to help better communicate Cambridge Engineering Biology research to external parties; iv) roll out of our Industry Partnership Plan and tiered sponsorship scheme to allow both smaller and larger companies to sponsor our events and activities. Other industry-related activities may include the use of surplus funds to run a collaborative academia-industry pump-priming call and running an engineering biology-focussed industry day or career's fair for university researchers. Additionally, the IRC will continue to explore philanthropic and grant funding opportunities.

2. Creating a (physical) Centre for Engineering Biology

The IRC is working to appoint a working group to explore strategies for establishing a new space for synthetic and engineering biology in Cambridge. This will include scoping the current landscape at the University, outlining the form and focus of such a physical centre, exploring options for a physical location, and identifying potential sources of funding, such as Research England, philanthropic donations (in collaboration with CUDAR), or industry partnerships. We strongly believe that this would (i) provide major benefits for scientific and technical innovation and exchange, (ii) match similar initiatives in competing international institutions, and (iii) better position the University to exploit our talents in this new field, which underpins the future bioeconomy.

3. Facilitate Various Forms of Translation to Impact

The IRC also plans to continue its support for open technologies and researcher-led projects and has identified a potential gap in opportunities provided by other bodies within the university in providing researchers with support for achieving impact via social enterprises, open-source companies and non-profit organisations. The Engineering Biology community, including several members of the steering committee, have a strong background and experience in this area which the initiative will share with the wider community via new activities such as a focussed seminar series or training workshops. Other activities in this area may include expanding our collaborative work with policy makers, social scientists and humanities initiatives such as the Centre for the Study of Existential Risk (CSER), the Centre for Science and Policy (CSaP) and the Kavli Centre for Ethics, Science, and the Public.

Relationship with the Schools and host Department

4. Are there any issues around the relationship between the IRC and the Schools or host Department that you would like to bring to the attention of RPC and the Schools?

For the most part, this works well, but we have had issues with booking flights and some other difficulties with ordering because the IRC needed to be embedded in the department. Overall, we think that with good communication we can overcome these issues.

Use of Administered Fund award

5. How are you using the funding awarded from the Administered Fund?

Cost	Expenditure 2022/23	Estimated Expenditure 2023/24
Staff Costs	-£87,762	-£91,848
Meetings and Events	-£18,118	-£43,880
Website & Comms		-£10,000
Training Courses & Practical Workshops	-£9,300	
Open Technologies Project	-£20,000	
General Administration		-£2,000
Funding		
Administered Funding	£90,000	£90,000
Surplus from previous year	£104,910	£70,929
Cafe Synthetique Sponsorship	£1,200	
Open Technologies Project Funding	£10,000	
Total	£70,929	£13,201

We made significant savings in 2020/21 due to the COVID-19 related suspension of large and in-person events, producing savings on venue hire, advertising, catering and travel/accommodation for overseas speakers. Further, some of the administrative costs (part of the coordinator salary, and all of the Biomaker costs, £265K) were supported by external grant funding from 2019-2022. A delay in the appointment of the events and communications assistant also resulted in further savings in 2022. Staff costs now make up a significant proportion of our spending and will exceed the administered funding in 2023/24. In 2023/24 we will make use of our surplus funds to cover the deficit in funds for our other activities. Going forward, we will require additional funding (through grants and/or sponsorship) to cover the full breadth of our activities.

Annex: IRC Steering Committee

When has the Steering Committee met in the past 12 months?

13 December 2023, 28 February 2023, 27 June 2023, 14 Nov 2023

Please list the Chair(s) and members of the Steering Committee:

Name	Department or other affiliation	School
Dr Jim Ajioka	Department of Pathology	SBS
Dr Lara Allen	Centre for Global Equality	N/A
Dr Somenath Bakshi	Department of Engineering	ST
Prof Jeremy Baumberg	Department of Physics	SPS
Dr Betty Chung	Department of Pathology	SBS
Dr Pietro Cicuta	Department of Physics	SPS
Dr Lorenzo Di Michele	Department of Physics	SPS
Dr Robert Doubleday	Centre for Science and Policy	N/A
Dr Ljiljana Fruk	Department of Chemical Engineering and Biotechnology	ST
Dr Rosalyn Gregory	Research Strategy Office	N/A
Prof Lisa Hall	Department of Chemical Engineering and Biotechnology	ST
Prof Jim Haseloff	Department of Plant Sciences	SBS
Prof Florian Hollfelder	Department of Biochemistry	SBS
Prof Mark Howarth	Department of Pharmacology	SBS
Dr Alexandre Kabla	Department of Engineering	ST
Prof Laura Machesky (Co-Chair)	Department of Biochemistry	SBS
Mr Christopher Micklem	Sainsbury Laboratory	SBS
Dr Richard Milne	Kavli Centre	SHSS
Dr Jenny Molloy (Co-Chair)	Department of Chemical Engineering and Biotechnology	ST
Dr Robert Mullins	Computer Laboratory	ST
Dr Stephanie Norwood (Coordinator)	Department of Biochemistry	SBS
Dr Timothy O'Leary	Department of Engineering	ST
Dr Andrew Phillips	AstraZeneca	N/A
Ms Vicky Reid (Events & Comms)	Department of Biochemistry	SBS