

Synthetic Biology Leadership Council**Minutes of the meeting held on Wednesday 17th July 2013****Room C19, BIS Conference Centre, 1 Victoria Street, London, SW1H 0ET.****Attendees**

Co-chairs: Prof Lionel Clarke (Shell Global Solutions); Rt Hon David Willetts (BIS).

Leadership Council: Prof Janet Bainbridge (UK Trade and Investment); Carol Boyer-Spooner (Chemistry Innovation KTN and IBLF); Dr Belinda Clarke (Technology Strategy Board); Dr Simon Dolan (GlaxoSmithKline); Paul Gemmill (RCUK); Prof Richard Kitney (Imperial College London); Sharmila Nebhrajani (Association of Medical Research Charities); Prof Dale Sanders (John Innes Centre); Prof Joyce Tait (ESRC Innogen Centre, University of Edinburgh); Prof Janet Thornton (European Bioinformatics Institute).

Observers: Mike Edbury (Government Office for Science); Ron Egginton (Research Funding Unit, BIS). John Betts (Research Funding Unit, BIS).

Invited speakers: Prof Drew Endy (Stanford); Rick Johnson (Global Helix); Prof David Castle (ESRC Innogen Centre, University of Edinburgh, via telecon).

Secretariat: Dr Amy Tayler (SynBio SIG and Biosciences KTN); Dr James Brown (SynBio SIG and Biosciences KTN); Chris Warkup (Biosciences KTN).

Apologies

Dr Anne-Marie Mazza (National Academy for Sciences, invited speaker); Dr Andy Boyce (UK Contact for the Synthetic Biology ERA-NET and BBSRC, invited speaker).

1 Welcome and Introductions

The chair welcomed the attendees to the second full meeting of the Synthetic Biology Leadership Council (SBLC) and reminded the delegates that our invited speakers would join us for item 2.

The Chair introduced the following individuals: **Dale Sanders** (John Innes Centre) attended the SBLC for the first time; **Paul Gemmill** (RCUK) who replaces Amanda Collis (RCUK) while she is on detached duty in Boston; **James Brown** (newly appointed director of the SynBio SIG, Biosciences KTN); **John Betts** (Research Funding Unit, BIS), who will start a six month internship in September 2013; and **Amy Tayler** (new member of SynBio SIG and Biosciences KTN).

2 Minutes and actions from the last meeting

The minutes of the meeting held on Thursday 14th March 2013 were accepted and will shortly be published online. In future, minutes will be agreed via correspondence.

Action: Minutes from 2nd meeting of SBLC (agreed) to be uploaded to SBLC pages on _connect (Amy Tayler, ASAP)

The actions from the meeting held on Thursday 14th March 2013 were reviewed and discussed. These are included in Annex 1 for reference.

Action 1

Noted as done.

Action 2

Update to follow under item 4.

Action 3

Paul Gemmill explained that the SBLC multi-disciplinary research centres sub-group did not form due to other commitments. It was subsequently decided that the involvement of the academic members in the development of the call for synthetic biology multi-disciplinary research centres (MDRCs) would have constituted a 'conflict of interest'. BBSRC received 28 expressions of interest, all of which demonstrated engagement and partnership with industry. A workshop was held in June 2013 to help potential applicants further develop their proposals. The SBLC was represented at this workshop by Lionel Clarke, Belinda Clarke and Paul Gemmill thus fulfilling the required engagement with the SBLC. Joyce Tait also attended, representing one of the potential applicants. The great enthusiasm for the call suggests the Research Councils will receive some truly excellent applications by the full proposal deadline on 18th July 2013.

Action 4

Noted as done, with clarification that the brief focussed on technical standards (not social standards).

Action 5

Noted as done.

Action 6

Noted as done. Carol Boyer-Spooner explained that the formation of the Industrial Biotechnology Leadership Forum (IBLF) has allowed coordination of multiple initiatives into a coordinated programme (in the same manner as the SBLC). Steve Bagshaw (Fujifilm Diosynth Biotechnologies) has replaced Ian Shott (Shott Trinova LLP) as chair of the IBLF, although Ian will still be a member. '*Leading IB – A UK showcase*', attended by approximately 280 people, very effectively demonstrated that the UK is serious about industrial biotechnology. As the IBLF plans events going forward they will be coordinated with the activities of the SBLC via the industrial biotechnology and synthetic biology special interest groups, both of which are managed by the knowledge transfer networks.

Action 7

Belinda Clarke explained that the Small Business Research Initiative (SBRI) instrument is a *challenge-led* mechanism for government procurement. Synthetic biology is an enabler that could help meet a challenge highlighted in an SBRI call, but synthetic biology *per se* will not be highlighted or identified in an SBRI call. Belinda will continue to work with colleagues to identify SBRI calls with opportunities for synthetic biology.

Action 8

Carol Boyer-Spooner reported that the IBLF commissioned Nesta to interview companies to identify challenges and opportunities around investment in industrial biotechnology. Nesta have produced a report entitled '[Financing Industrial Biotechnology in the UK](#)' (see also summary in Annex 2), in which it makes a series of policy recommendations to support the development of new technologies and industrial biotechnology. The finance sub-group of the IBLF will work to deliver against these recommendations.

Belinda Clarke has recently conducted a survey to establish the appetite for investment in synthetic biology, which will later be shared with the SBLC. Recent discussions during the SB 6.0 conference suggest that synthetic biology is attracting the attention of investors. Ron Egginton reported that David Willetts has been approached by an overseas company wanting to invest in synthetic biology in the UK. In the future, requests like this may be shared with the SBLC to obtain feedback on strategic alignment. The council agreed that James Brown should be the principle point of contact for those looking to invest in synthetic biology in the UK.

Action: Data from survey to establish the appetite for investment in synthetic biology to be shared with the SBLC (Amy Tayler (Belinda Clarke), ASAP).

Biosciences KTN runs a small, informal group called BioVentures, which brings together funders and those seeking funding. James Brown will explore opportunities for a specific BioVentures event to support synthetic biology.

Actions: Biosciences KTN to consider running a BioVentures event focussed on synthetic biology. If approached, SBLC members to pass the details of interested investors to James Brown (James Brown (all), on-going).

Action 9

The council agreed that a Dropbox folder would be a suitable tool to support collaborative working among the SBLC members.

Action: Dropbox folder to be set up for collaboration amongst the SBLC members (Amy Tayler, ASAP).

Actions 10

UKTI is conducting a marketing push to promote commercialisation of innovations in the 'eight great technologies': big data and energy efficient computing; satellites and commercial applications of space; robotics and autonomous systems; life sciences, genomics and synthetic biology; regenerative medicine; agri-sciences; advanced materials and nano-technology; and energy and its storage.

Synthetic biology has the potential to deliver in multiple sectors (e.g.: in the shorter term it stands to be of real benefit in the pharmaceutical/life sciences/healthcare and energy sectors whilst longer term it could complement the objectives of the Agri-Tech strategy to be announced on Monday 22nd July 2013). UKTI, which has recently received considerable investment, could be another significant

government body that could support the development of synthetic biology. Synthetic biology should be highlighted to the various sector directors within UKTI.

Action: Highlight synthetic biology to the various sector directors within UKTI (Janet Bainbridge, on-going).

Members of the synthetic biology special interest group (SynBio SIG) were recently invited to complete a questionnaire asking which three things are required to further support the development of synthetic biology in the UK. Lionel Clarke summarised the results from 106 respondents: (i) better access to funding through a facilitated process; (ii) better connections and partnerships, in which the SynBio SIG and synthetic biology innovation and knowledge centre (IKC) will play a role; and (iii) better information and processes to enable commercialisation and the removal of avoidable and unnecessary barriers. Issues relating to intellectual property were highlighted by relatively few respondents. James Brown will combine the outputs of the questionnaire with data collected previously at road-mapping workshops.

Action: Revisit data from roadmap workshops, SynBio SIG questionnaire and TSB data (James Brown, on-going).

The SBLC agreed that an article should be posted on the SBLC website highlighting recent funding commitments and associated SBLC activities (including but not limited to the SynBio SIG questionnaire, the announcement of the IKC, the call for MDRCs, and government funding commitments). A common logo available for any synthetic biology activity and a consensus view on the value proposition would greatly help with the promotion of synthetic biology.

Action: Agree joint statement of recent activities, case studies, value proposition and joint synthetic biology logo for publication on SBLC website (James Brown (Ron Egginton, Belinda Clarke, Richard Kitney, Paul Gemmill, Janet Bainbridge – to be signed off by Lionel Clarke), ASAP).

Actions 11 and 12

Belinda Clarke will present the map of synthetic biology capabilities within the UK at the next meeting of the SBLC, together with the outputs of a valuation exercise, which will estimate the value of synthetic biology to the UK. This activity comprises telephone interviews with companies and a questionnaire for academics. The methodology can be repeated each year to measure progress and generate projections. The council made two recommendations: (i) companies should be asked what they define as synthetic biology, and (ii) the use of R&D tax credits should be explored (and promoted) through this activity.

Action: Map of the UK synthetic biology community and outputs from the synthetic biology valuation exercise to be presented at the next meeting of the SBLC (Belinda Clarke, 16th October 2013).

Actions 13 and 14

There is currently a lot of activity regarding regulation and governance (which includes engagement) for synthetic biology. The council acknowledged that these are complex issues. However, the council is focussed on responsible innovation and it must have an appropriate structure in place to facilitate quick responses to requests for advice regarding key messages around synthetic biology. The current members of the stakeholder engagement sub-group should convene to discuss these complex issues (including the existing regulatory frameworks that apply to synthetic biology) and determine the membership and role of the sub-group moving forward. The council will liaise with other organisations conducting engagement regarding synthetic biology.

Action: Stakeholder engagement and regulation and governance issues sub-groups to meet and to involve John Betts (BIS) from September 2013 (Joyce Tait (Janet Bainbridge, Chris Warkup, Ron Egginton, Paul Gemmill, Richard Kitney, Lionel Clarke, Sharmila Nebhrajani), ASAP).

Action 15

Noted as done.

Action 16

Noted as done.

Action 17

To be addresses under item 7.

2 Arrival of invited speakers, welcome and introductions

The chair welcomed Prof Drew Endy (Stanford) and Rick Johnson (Global Helix) to the meeting. The SBLC members briefly introduced themselves.

3 Update on SB 6.0 and ERASynBio activities

Drew Endy presented an update on SB 6.0 (see Annex 3). The conference was well attended (sold out with 750 delegates) and was a great success. This event brought people together from across the globe and a wide variety of disciplines around a common interest in synthetic biology. Coming together, interacting and working collaboratively are crucial to the progression of synthetic biology. Many satellite meetings were held around the margins of SB 6.0.

The strategic government leadership and commitment to synthetic biology in the UK helped bring the conference to Imperial College London, the first time an SB conference has been held in the UK. SB 6.0 attracted a lot of press coverage, which the delegates handled excellently.

A lot of progress has been made since SB 1.0 in 2004. Despite early reservations, synthetic biologists are beginning to bring predictability to standardised parts. Highlights from SB 6.0 included: the involvement of members of the British design community to consider consumer products arising from synthetic biology; new applications in energy, sustainability, conservation and global health; and the ability to have an open dialogue about synthetic biology (especially with regard to responsible research and innovation). SB 7.0 has not yet been planned, but it will happen.

Paul Gemmill presented an update on the activities of ERASynBio (see Annex 4) on behalf of Andy Boyce. Work to map the European synthetic biology landscape suggests that there are a lot of activities underway (only some of which involve ERASynBio). Academic strengths lie in the UK, Germany and France, whereas business activities (mainly medical and white biotechnology companies) are focussed in the UK, Germany and Switzerland. The UK will not be able to take part in all European activities and must focus its activities accordingly.

The Massachusetts Institute for Technology (MIT) and the Woodrow Wilson International Centre for Scholars are collaborating to monitor development in synthetic biology across the globe. 31 countries have recently declared that they are developing international strategies for synthetic biology, suggesting that there are many opportunities for international collaboration. Early reports suggest most activity is focussed in US and EU, with increasing activity in China, Japan and Korea. ERASynBio sent a mission to the US (Boston, Washington and California) to meet with leading researchers and funders. This mission has resulted in some new collaborations. In the margins of the mission, BBSRC also met with Darpa, NSF and other funding agencies. These meetings have deepened the relationship with NSF, which now invests in ERASynBio. This will allow the participation of researchers based in the US.

Recent ERASynBio meetings and activities include: the first ERASynBio PhD student summer school in Madrid, Spain; community building through a meeting of the heads of the EU synthetic biology centres of excellence; the announcement of 11 twinning awards to support collaborations, almost all of which involved UK partners, demonstrating that the UK is a partner of choice within Europe.

ERASynBio conducted a survey to explore infrastructure requirements for synthetic biology. The survey received 189 responses, mainly from the UK, France and Germany. The council acknowledged that the synthetic biology community is still in the early stages of sharing parts: registries of bio-parts and tools to support data exchange are still under development and in testing phases. Policy evidence could also make it easier for groups to work together.

The first joint call for transnational research projects is currently open with a closing date of 26th August 2013. BBSRC is investing £3 M with a further £12.5 M from other funders. It is hoped that UK-based projects will be awarded in excess of £3 M.

ERASynBio is also working on a strategic white paper for European synthetic biology, which will make a series of recommendations regarding funding, governance, community building, training, education and infrastructure. The white paper will form the basis of a second joint call in 2014. There is the opportunity for the UK to feed into this document. The SBLC will engage in this process through Andy Boyce.

Action: SBLC to work with Andy Boyce (ERASynBio) to contribute to strategic white paper in advance of 2nd joint call from ERASynBio (Paul Gemmill (Lionel Clarke), on-going).

The council acknowledged that whilst there is huge potential for collaboration, it can be difficult for researchers to scale their relationships, and researchers can 'burn-out' on international

collaborations. Funding agencies in different countries lack commitment to harmonised funding schemes, which makes it difficult for researchers to collaborate. For example, each international funding agency will usually only fund participants in their own country: it is very difficult to persuade funding agencies to fund outside their national boundaries. The partnership between the UK and Norway is a good example of a successful collaboration, in which both partners benefit. One view is that the UK is probably more closely aligned to the US than EU; the UK and US have a clear definition of synthetic biology and greater emphasis on the engineering aspects, whereas the EU has a looser definition of synthetic biology and a greater focus on the biology. The US already has strengths in pharmaceuticals, therapeutics, food and chemicals. There are many potential applications for synthetic biology. Partnerships could be considered in new areas, such as cellular therapeutics, biology for medical diagnostics and conservation biology. Opportunities for UK-international collaboration related to synthetic biology include bioinformatics and gene synthesis.

The Presidential Commission for the Study of Bio-ethical Issues released its first report, *'New Directions: The Ethics of Synthetic Biology and Emerging Technologies'*, in December 2010. The SBLC considered this report to be an interesting and potentially valuable reference.

4 Intellectual property rights and patenting for innovation in synthetic biology

David Castle joined the meeting by teleconference before Rick Johnson delivered a presentation (see Annex 5) on the six Academies symposium on synthetic biology – *'Ownership and Sharing: Setting the Patent Framework for Innovation in Synthetic Biology'*.

The main themes and discussion points raised three short-term actions: streamline and expand the boundaries of material transfer agreements (MTAs) and ease-of-use (including university-industry flows); Make freedom to operate (FTO) easier and more predictable – consider options for creating synthetic biology patent clearinghouse(s)/safe harbours/landscapes; and develop an education/outreach programme for students, post-docs, and early career researchers in the synthetic biology community ('IPR 101').

The meeting also raised the following potential areas of collaboration between the UK and US: - a new six academies thematic module on "Ownership, Sharing, and Diffusion" (UK, U.S., and China); develop "best practices" recommendations and guidelines for IPR management in synthetic biology (involving NAS, Royal Society, RAE, and BioBricks Foundation); and create a UK-US university-industry technology sharing "collaboratory" in synthetic biology.

David Castle described a previous UK meeting entitled *'Synthetic Biology, Innovation and Intellectual Property: Toward a UK Strategy'*. This meeting had a UK focus in a global context. In agreement with the meeting involving the six Academies symposium, the UK meeting concluded that whilst synthetic biology brings new challenges, there isn't a need to change the intellectual property (IP) framework. At present it is often unclear when to use an open or proprietary practice. However, there is scope to improve our practices. For example, patent attorneys could work with researchers and companies to develop new business models and blended strategies for IPR that hybridise patents, copyrights and information in the public domain, or semi-commons licences that evolve over time. The UK should consider best-practice guidelines available in the US.

The council noted that there are many definitions of 'open innovation' which vary between individuals and institutions. The six-party symposium considered that IP could be shared until an investor steps in to protect it, although the council suggested that caution must be used to balance openness with potential irresponsible implementation of information in the public domain. In the US, Addgene facilitates the sharing of genetic tools between academics but does not allow them to be used for commercial purposes. Addgene has started to include terms and conditions reminding recipients not to break the law or do any harm with the shared genetic material. The contributor of the genetic material is given final decision over whether the use of a particular part is harmful or not. However, this process has the potential of becoming increasingly complicated with devices comprising many parts. In this case, Addgene must act as a clearing house. With regard to 'biohackers', the approach to openness must be managed. An infrastructure already exists to protect clinical data, which could be applied to synthetic biology data. A new global alliance for sequencing data already has a lot of members abiding by the code of conduct. Further commercialisation opportunities lie within the academic progress in bio-data.

Action: To discuss commercialisation efforts in bio-data (Janet Thornton and Richard Kitney, on-going).

The UK meeting noted that whilst strong property rights that protect an investment and help bring something new to commercialisation are to be encouraged, patents that could potentially block innovation should ideally not be awarded, or at least limited to reasonable scope. It is the responsibility of the IPO/EPO to check that patents are awarded responsibly. Whilst third party comments are welcome, individual members of the synthetic biology community may not be able to spare the time to monitor patents themselves. A centralised 'patent-watch' service would be valuable to the synthetic biology community.

Case studies for synthetic biology value chains may help stimulate the application of synthetic biology in other sectors and will highlight how companies are handling IPR. This could lead to guidelines for decision points.

Unlike the six Academies symposium, the UK meeting put greater emphasis on the interplay between standards and IP.

The council agreed that IP (protected or otherwise) needs to flow better from academia to industry.

The council made an analogy between synthetic biology and languages: successful languages that are widespread are free.

Action: Outputs from the UK and six-academies IP meetings to feed into the arrangements for the European IP meeting in October 2013 (Lionel Clarke (Richard Kitney, James Brown, Amy Tayler), on-going).

5 Opportunities for international collaboration

The SBLC is an internationally recognised group. However, issues surrounding synthetic biology are applicable around the world, and the US tends to be more effective than the UK at translating

science to applications and products. The NAS is also considering the development of a US synthetic biology roadmap. The SBLC should seek to partner with the NAS' new forum in the US and also to explore options for constructive interaction with groups outside of Europe such as China and potentially Japan and Korea.

Action: Explore opportunities for the SBLC to partner with the NAS forum in the US, to include case studies, the sharing of best practise with regard to IP and academic-industry collaborations, and the development of standards (Lionel Clarke, on-going).

Action: Explore opportunities for the SBLC to interact with China and possibly Japan and Korea (Lionel Clarke, on-going).

The US has three programmes of interest to the SBLC: (i) the Innovation Corps (iCorps) programme, which aims to keep talent in academia whilst realising applications; (ii) the synthetic biology leadership accelerator programme (SynBio LEAP), which has recently received funding to run for a further two cycles; and (iii) Internationally Genetically Engineered Machine (iGEM) competition. The iGEM competition now accepts 225 teams each year from across the globe. Randy Rettberg (President, iGEM) has proposed that an additional iGEM office should be hosted in Europe to provide administrative support to teams across Europe. There could be strategic value in making the UK the European hub for iGEM. iGEM is certainly a valuable educational vehicle and it develops entrepreneurial skills; a considerable proportion of synthetic biology spin-outs have come from iGEM participants. To date, iGEM is the best example of a successful shared registry of parts. However, the SBLC must balance the potential costs and how the UK will benefit. The SBLC has requested a written proposal from Randy so it can better judge the costs involved. The SBLC should consider the potential benefits of bringing elements of these programmes to the UK.

Action: Explore US programmes 'iCorps' and 'SynBio LEAP' and consider the value of bringing them to the UK (James Brown, on-going).

Action: As and when it is received, respond to Randy Rettberg's proposal to locate an iGEM office in Europe or the UK. (James Brown (Richard Kitney, Ron Egginton), on-going).

6 Summary presentations and discussion with David Willetts

SBLC members briefly introduced themselves to the minister. Lionel Clarke summarised the progress the SBLC has made since the last meeting and asked the invited speakers to give their perspective on current activities in the UK.

Drew Endy commended the recent appearance of the minister and the speech he delivered at SB 6.0. In general, the synthetic biology community does not successfully articulate what they are trying to do and the overall scope of their ambition. However, SB 6.0 highlighted stories that can be used to engage the public in synthetic biology. Drew highlighted the importance of leadership in the future development of synthetic biology. We need to invest in people not only to support excellent research but also excellent political, organisational and translational leadership. A US programme, SynBio LEAP, could be brought to the UK.

Rick Johnson summarised the outputs of previous meetings exploring IP issues and synthetic biology: the importance of being able to share knowledge without risking future value investment (as discussed with the Minister at a recent OECD panel meeting); there is not an either/or decision between openness or proprietary approaches; we need new models to drive research and commercial benefit; and we can use existing IP frameworks more effectively. There is an important role for policy and Government to ease IP issues and generate more value out of great research. The US and UK could share case studies relating to commercialisation of synthetic biology and best practice for academic/industrial collaborations.

The SBLC discussed the lack of multi-national funding commitments for transnational collaborations: projects often run in parallel rather than truly integrate. Difficulties such as these should be discussed with the appropriate bodies in the US and China. There is potential for better use to be made of the SBLC in an international capacity.

The SBLC noted that a number of private investors are looking to the UK for opportunities in synthetic biology. The SBLC will work with UKTI to develop a value proposition.

The SBLC discussed the importance of standards and measurement technologies for synthetic biology, which have the potential to better facilitate the sharing of biological parts. Work has been on-going for the last ten years, but lots of work is still required at the fundamental engineering level. Standards are still under development so it is understandable that uptake is limited thus far. The UK is participating in a five year EU FP7 programme (ST-FLOW) developing material and computational standards for synthetic biology. Standards are also an excellent opportunity for collaboration between UK and US, which could later lead to the propagation of international standards. BSI is working with the SBLC, TSB and the Research Councils to further explore synthetic biology standards.

The SBLC noted that key results in synthetic biology are published in high impact journals, and that multi-disciplinary research areas are handled better by funding agencies. However, synthetic biology does not always have a 'home' with a given institution and career progression/promotion can be difficult. The SBLC noted that any time it has an interaction with a junior academic, it should consider sending a letter to the appropriate head of department, thanking them for their assistance. This would give a higher profile to activities that might otherwise be overlooked.

Supply-chain pull and industry involvement are at the heart of developments in synthetic biology: the industrial community drives and justifies research, and determines whether work should be published or protected. Together, industry, the SBLC and Government are helping to drive an academic toolkit that will serve many industries.

Previous public dialogues and other feedback suggest the public seeks reassurance about scientific practices (details of a joint synthetic biology dialogue, subsequent evaluation and response, can be found at <http://www.bbsrc.ac.uk/society/dialogue/activities/synthetic-biology/synthetic-biology-index.aspx>). The SBLC actively encourages further stakeholder engagement. The synthetic biology community currently self-regulates through a responsible innovation strategy, backed by formal funding approval mechanisms. Belinda Clarke is planning a series of activities to support competence

building in responsible innovation. Belinda is also working with colleagues at BSI to explore the potential for additional generic guidance or standards regarding responsible innovation.

The SBLC recommends that regulations should be applied to applications rather than to the underpinning technology. Regulations must be appropriate for the relevant industry, and that will vary upon application. If there are particular concerns regarding the safety of particular applications of synthetic biology, the appropriate research should be funded to establish the facts and develop objective solutions.

Regulatory issues, standards, governance and stakeholder engagement are all closely related. The relevant subgroups should continue to explore this area.

7 Plans for the next meeting and summary of actions

Plans for the next meeting

The SBLC is committed to an open meeting on Wednesday 16th October 2013. A public venue with a capacity of approximately 50-70 will be sought in central London. The meeting will be publicised widely to encourage attendance. Individuals wishing to attend will be required to register in advance. Those wishing to ask a question are expected to submit their question in advance to allow the SBLC members to do justice to the question, although the chair may also wish to invite questions from the floor.

Action: Speak to FSA and Defra re: arrangements for open meetings (Amy Tayler and James Brown, ASAP).

Potential agenda items include: map of synthetic biology in the UK and value proposition; synthetic biology investment and commercialisation; standards; and the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (TBC).

David Willetts and Geneviève Fioraso (French minister for Higher Education and Research) may be able to join the meeting towards the end of the day.

The dates of the 5th and 6th meetings of the SBLC will be organised shortly.

Action: Arrange dates for 5th and 6th meetings of the SBLC, March and July 2014 (Amy Tayler, ASAP).

The actions were summarised as follows:

Summary of Actions from 3rd SBLC meeting (17th July 2013)

#	Action	Owners (participants)	Deadline
1	Minutes from 2 nd meeting of SBLC (agreed) to be uploaded to SBLC pages on _connect	Amy Tayler	ASAP
2	Data from survey to establish the appetite for investment in synthetic biology to be shared with the SBLC	Amy Tayler (Belinda Clarke)	ASAP
3	Biosciences KTN to consider running a BioVentures event focussed on synthetic biology. If approached, SBLC members to pass the details of interested investors to James Brown	James Brown (all)	On-going
4	Dropbox folder to be set up for collaboration amongst the SBLC members	Amy Tayler	ASAP
5	Highlight synthetic biology to the various sector directors within UKTI.	Janet Bainbridge	On-going
6	Revisit data from roadmap workshops, Syn Bio SIG questionnaire and TSB data (see action 7)	James Brown	On-going
7	Agree joint statement of recent activities, case studies, value proposition and joint synthetic biology logo for publication on SBLC website (see action 6)	James Brown (Ron Egginton, Belinda Clarke, Richard Kitney, Paul Gemmill, Janet Bainbridge – to be signed off by Lionel Clarke)	ASAP
8	Map of the UK synthetic biology community and outputs from the synthetic biology valuation exercise to be presented at the next meeting of the SBLC	Belinda Clarke	16 th October 2013 (next meeting)
9	Stakeholder engagement and regulation and governance issues sub-groups to meet and to involve John Betts (BIS) from September 2013	Joyce Tait (Janet Bainbridge, Chris Warkup, Ron Egginton, Paul Gemmill, Richard Kitney, Lionel Clarke, Sharmila Nebhrajani)	ASAP
10	SBLC to work with Andy Boyce (ERASynBio) to contribute to strategic white paper in advance of 2 nd joint call from ERASynBio	Paul Gemmill (Lionel Clarke)	On-going
11	To discuss commercialisation efforts in biodata	Janet Thornton and Richard Kitney	On-going
12	Outputs from the UK and six-academies IP meetings to feed into the arrangements for the European IP meeting in October 2013	Lionel Clarke (Richard Kitney, James Brown, Amy Tayler)	On-going
13	Explore opportunities for the SBLC to partner with the NAS forum in the US, to include case studies and the sharing of best practise with regard to IP and academic-industry collaborations	Lionel Clarke	On-going

14	Explore opportunities for the SBLC to interact with China and possibly Japan and Korea	Lionel Clarke	On-going
15	Explore US programmes 'iCorps' and 'SynBio LEAP' and consider the value of bringing them to the UK	James Brown	On-going
16	As and when it is received, respond to Randy Rettberg's proposal to locate an iGEM office in Europe or the UK.	James Brown (Richard Kitney Ron Egginton)	On-going
17	Speak to FSA and Defra re: arrangements for open meetings	Amy Tayler and James Brown	ASAP
18	Arrange dates for 5 ^h and 6 th meetings of the SBLC, March and July 2014	Amy Tayler	ASAP

The Chair thanked the SBLC members and invited speakers for their participation before closing the meeting.

Actions from the SBLC meeting on Thursday 14th March 2013

Action No.	Activity description	Owner
1	<ul style="list-style-type: none"> Joyce Tait to draft key points for a letter from David Willetts to Owen Paterson regarding the regulation of synthetic biology and the CBD. 	<u>J Tait</u>
2	<ul style="list-style-type: none"> Secretariat to give the go ahead to David Castle to organise the IP workshop Richard Kitney and Lionel Clarke to liaise with David Castle on the invitation list for the IP workshop to take place in May or June 2013; To circulate this list to SBLC for suggestions 	<u>Secretariat</u> ; <u>RK and LJC</u> ; All
3	<ul style="list-style-type: none"> A subgroup of the SBLC to work with RCUK and assist in the development of the multidisciplinary research centres to be funded from the new BIS capital funding 	<u>AC, RK, SD, SO (or DS)</u>
4	<p>At Minister's request:</p> <ul style="list-style-type: none"> Richard Kitney will brief the Minister on Standards; Joyce Tait will brief the Minister on CBD and Cartagena Protocol. 	RK JTait
5	<ul style="list-style-type: none"> Richard Kitney to circulate slides on standards to SBLC members 	RK
6	<ul style="list-style-type: none"> Carol Boyer-Spooner to provide notes about the IBLF event - IB: a UK showcase, which took place in January 2013 	CB-S
7	<ul style="list-style-type: none"> Belinda Clarke to explore opportunities for government procurement of products of synthetic biology for the July SBLC meeting 	BC
8	<ul style="list-style-type: none"> Carol Boyer-Spooner to produce a summary on what can be learnt from the IBLF activity on finance and Venture Capital for the July SBLC meeting 	CB-S
9	<ul style="list-style-type: none"> LJC and the Secretariat to ensure all the outputs from the roadmap activities are accessible to SBLC members, e.g. via Dropbox or equivalent cloud folder. 	<u>LJC</u> and Secretariat
10	<ul style="list-style-type: none"> Identify an external independent body to help prioritise the Commercialisation efforts and drive this agenda; Consider accelerating the pace of commercialisation via the concept of 'Ice breakers', drawing upon the outputs of the UK Roadmap Workshops and other sources; Identify value chains, address potential blockers and enablers. 	LJC, JB, SD <u>LJC</u> , BC and Secretariat
11	<ul style="list-style-type: none"> Develop proposals to progress the remaining 'top 4' bullet points on commercialisation, leading to an action plan with timelines to report back to the next meeting 	<u>Commercialisation sub-group (JB, SD, LJC)</u> ; BC and

		Secretariat
12	<ul style="list-style-type: none"> Belinda Clarke to present her 'final' mapping of the UK Synthetic Biology community and repeatable methodology (at the July or Oct meeting?) 	BC
13	<ul style="list-style-type: none"> Joyce Tait to lead a sub-group, including Janet Bainbridge, Chris Warkup, and Ron Egginton, to look at regulatory and governance issues and linking this activity to ESBAC work on this topic. <ol style="list-style-type: none"> Sub-group to define its remit; Review what is being/has been done on regulatory issues Other volunteers to contact Joyce Tait 	<p>JTait; JB; CW; RE</p> <p>All</p>
14	<ul style="list-style-type: none"> LJC to liaise with Science Wise to ask if they would agree to be the impartial external body delivering the paper on future public engagement and communication on synthetic biology; <p>Initiate planning of future stakeholder dialogue and engagement:</p> <ul style="list-style-type: none"> Joyce Tait to send a draft paper about stakeholder engagement; Amanda Collis to liaise with BBSRC Public Engagement (Patrick Middleton) for their involvement; Richard Kitney will speak to Prof. Nikolas Rose at Kings' College for his involvement; 	<p>LJC</p> <p><u>Stakeholder Engagement subgp</u></p> <p>JTait</p> <p>AC</p> <p>RK</p>
15	<ul style="list-style-type: none"> LJC to invite a few representative international visitors who are attending the SB 6.0 Academies event in London (e.g. Drew Endy) to the July meeting for a session addressing International Engagement 	LJC
16	<ul style="list-style-type: none"> LJC and Shamimara Ahmed to investigate possible move of July SBL3 meeting from 18 to 17 July 	<u>LJC</u> ; SA; Secretariat
17	<ul style="list-style-type: none"> Lionel Clarke and Secretariat to propose a format for the open meeting in October at the July meeting 	LJC and Secretariat

**On the 18th October 2011 NESTA launched its report on
'Financing Industrial Biotechnology in the UK'.**

The findings of this report are consistent with the findings and recommendations of the INDUSTRIAL BIOTECHNOLOGY – INNOVATION AND GROWTH TEAM, which was established in 2007. The IB-IGT REPORT (with the recommendations), was published May 2009, with Government responses in June 2009. Many of the recommendations are in place and managed by the IB Leadership Forum.

There are around 1000 companies that could potentially drive increased value through the utilisation of Industrial Biotechnology. The challenge is to ensure that the UK positions itself as a leader in the development and deployment of IB based technologies and processes.

In considering the real and substantial financing issues facing the IB sector in the UK, the 8 principle recommendations in the NESTA report are clustered in 3 areas:

1. Policy recommendations specific to IB;
2. Policy recommendations that are generic to technology development;
3. Observations that are relevant to the research community.

Of the 8 principle recommendations, 4 are already underway with the Task and Finish group activity of the IB Leadership forum, including the IB Special Interest Group company engagement program.

NESTA is taking forward this report in two ways:

Technology policy

As the research noted, some of the recommendations apply to technology development more generally.

NESTA is intending to develop the recommendations from this report that are generic to technology in a policy paper that will also capture and develop recommendations from other reports on the biomedical industry and semiconductors.

Policy measures such as encouraging collaboration; using demonstrators and other shared infrastructure to lower costs; stimulating more sources of finance are common recommendations in several sectors. NESTA is intending to explore the common features shared by a number of capital-intensive and innovative industries. We hope to provide a detailed set of developed policies that can support these broad intentions across a number of technology sectors, supported by evidence on the measures that are most effective. This piece of work is currently being scoped, and we expect to publish it around Q2 in 2012.

Access to finance

NESTA has an on-going programme of research on access to finance for innovation. This has included a series of [reports on the venture capital markets](#). Current work in this area is looking at alternative forms of finance, outside of venture capital and traditional bank lending.

A current project that will run to June 2012 aims to plot and analyse a form of emerging finance known as crowdfunding, as well as providing an empirical analysis of how crowdfunding is used by businesses. The research will recommend changes that can foster these alternative initiatives and facilitate capital formation.

Another stream of work, [Beyond the Banks](#), has examined the potential of SME bonds, and will continue to look at other forms of alternative lending in 2012.

In addition to the above the following observations are noted (recommendations from the report in italics).

Recommendation 2. Development funding is made available to encourage more active collaboration between corporates, SMEs and the academic community. Such funding could lever in corporate investment and support measures.

In paragraph 1.123 of the Autumn statement, there appears to be some progress towards achieving the NESTA report's second recommendation to improve collaboration between corporates, SMEs and the research community with the allocation of £75m additional funding to support SMEs to develop, demonstrate and commercialise new products and services and an additional £200m funding to support science, including £25m to support large scale demonstrators. There is also reference to an "above the line" tax credit for corporates to encourage them to invest in R&D. The detail of how this additional funding will be spent or where it will be allocated is not entirely clear yet, but the commitment to spend it is a positive development. A link with the UKTI (via Lord Green) has been established and the IBLF is progressing the joint plans.

Recommendation 3. Targeted measures to stimulate lending to those IB SMEs which have made considerable progress reducing technology risk and now need to invest in the elimination of scale-up risk. The criteria for assessing which companies qualified for such support would need to be specific to the technology concerned, but the support measure itself, could apply across a variety of technologies. Such measures could include loan guarantee schemes and encouraging state-controlled banks to offer debt facilities to venture lending funds.

The credit easing measures announced in the Autumn statement (see page paragraphs 1.114-1.118 on page 38 onwards in the attached) enhance the existing mechanisms, which may allow IB SMEs to access the size of the loans they need to scale up their production capacity to a scale where the business starts to generate revenue.

Recommendation 4. The tax system is modified to recognise the existence of virtual companies and to encourage the development of technology based start-up companies by:

- a. Creating a virtual company legal and tax template in the same way that templates have been established for VCTs or EIS qualifying businesses.*
- b. Simplifying the administration of R&D tax credits.*

The SEIS could be seen as progress towards achieving the fourth recommendation in the report, which recommends that the tax system is modified to recognise the existence of virtual companies and to encourage the development of technology-based start-up companies. The creation of a Seed Enterprise Investment Scheme is not specifically mentioned, but it is clear that this measure has been designed to encourage Angel investors to provide seed investment to start-up companies, which meets the spirit of the recommendation.

Agreed Next Steps:

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| 1. Summary paper clarifying the position and next steps to Mark Prisk (this paper) | 19/12/ 2011 |
| 2. Engagement with Lord Green to progress the connection with UKTI | 21/12/2011 |
| 3. Update on overall 'IBLF' progress prior to IBLF meeting | April 2012 |