**MINUTES**
**Fifteenth meeting of the Synthetic Biology Leadership Council (SBLC)**
**Governance Sub-Group (GSG)**
**13:30 –16.30, Tuesday 18th October, 2018.**
**Room 4L, BEIS Offices, 1 Victoria St., London.**

## Attendees

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| Joyce Tait (JT) | SBLC GSG Chair |
| Lionel Clarke (LC) | SBLC Co-chair |
| Janet Bainbridge (JB) | DIT |
| Andrew Cottam (AC) | HSE |
| Rocky Cranenburgh (RC) | Prokarium/BIA |
| Paul Henderson (PH) | BEIS |
| Julian Hitchcock (JH1) | Marriott Harrison LLP |
| Alistair Kent (AK) | Independent |
| Sarah Miles (for Jamie Parkin) (SM) | UKRI/BBSRC |
| Hadyn Parry (HP) | Independent |
| Hilary Sutcliffe (HS) | Society Inside |
| Jonathan Napier (JN) | Rothamsted Research, Guest Speaker |

*Apologies:* Louise Ball (LB1), Linda Brookes (LB2), Paul Freemont (PF), Richard Kitney (RK)

**Welcome to new members**

JT welcomed new members who have joined the GSG since its last meeting – Rocky Cranenburgh, Paul Henderson, Sarah Miles (in place of Jamie Parkin) and Hadyn Parry.

**1. Minutes of last meeting – action points and matters arising**

The minutes from the 14th meeting of the GSG on 19th June 2018 (Paper 15.1) had been approved by GSG members by email and were then approved by the SBLC meeting on 19th July, to be uploaded to the SBLC website.

***Carried forward from earlier meetings:***

**Action 1.1 Jackie Hinton to circulate the UK Biosecurity Strategy as soon as it is available.**
Paul Henderson will update us.

**Action 1.2 JT to follow up with the Wellcome Trust how they would like to take forward their interactions with the GSG, in the context of our revised terms of reference.**

**Action 1.3 The proposal to facilitate a meeting with key regulators in the life science area is inevitably linked with the Brexit context.**
The GSG, through the SBLC, should seek opportunities to arrange such a meeting as soon as there is an opening (after March 2019). AC noted that HSE Bioeconomy Sector Plan deals with these issues in the context of safe innovation and could contribute to extending this thinking more widely (http://www.hse.gov.uk/aboutus/strategiesandplans/sector-plans/bioeconomy.pdf).

***Outstanding from the GSG meeting of 26/2/18:***

**Action 2 JT to invite somebody from BSI to the next GSG meeting to discuss how they would develop standards for this area.**
Deferred to the first GSG meeting in 2019**.**

**Action 3 LB1 to let us know whether there are any useful contributions that the GSG could make to future CBD-related discussions.**
Continuing

**Action 4 JT to invite Jaco Westra to the first GSG meeting in 2019.**

***Action Points from the GSG meeting* of 19/6/18**

**Action 1 LC to raise issues about funding silos at future SBLC meetings** (carried forward)**.**

**Action 2. JT to send the GSG comments on the two papers to Diane Beddoes at Sciencewise** (completed)**.**

**Action 3. Regarding the Cartagena Protocol online forum earlier this year on Public Awareness, LB1 to send the GSG the synthesis of the outcome** (completed)**.**

**Action 4. LB1 to send the GSG a link to this proposal** (completed)

**Action 5, HS to send WEF Report to GSG members** (completed)

**Action 6. All to follow up with contacts and to search relevant websites and to send to JT any relevant documents that emerge** (all have been continuing to circulate relevant papers as they come up)**.**

**2. Update on SBLC Developments - LC**

The main focus of SBLC now is on commercialisation aspects, including opportunities and blockers. They are looking for feedback from start-ups on what is required to get to higher technology readiness levels. This information will feed into a proposed sector deal as part of the bioeconomy strategy. This will be on the agenda for the Open Meeting in November. There is seen to be a need for a more coherent voice from the start-up community and with this in mind a commercialisation subgroup of the SBLC is being set up.

Noting that we had drafted a letter to Lord Henley on the Court of Justice of the EU (CJEU) ruling on the regulatory status of gene edited crop plants, a question was raised on where it is in the system.

**Action 1. PH agreed to follow this up with Lord Henley's office.**

PH also gave us feedback on the status of the Bioeconomy Strategy and the Sector Deal, both of which are progressing well and it is hoped the strategy will be published soon. Further funding may be available through another round of Industrial Strategy Challenge Funding, subject to future budget decisions.

**3. Revised GSG Terms of Reference**

Paper 15.2, Revised Terms of Reference, was discussed. Points raised related to:

- How to represent the variety of innovative tools and platforms that can be considered to be included under the term 'synthetic biology and related technologies';
- The need to include in the first paragraph a sentence describing what we do (as covered in more detail at the end of the current version;
- The opportunity to articulate one or two clear workstreams to be taken forward through the SBLC, potentially funded by UKRI or another body;
- Several detailed drafting suggestions.

We also considered how to have more direct and obvious influence on SBLC decision making and how to demonstrate this influence.

**Action 2: JT to revise the TOR based on this discussion and send it to GSG members for final approval.**

**4. Hadyn Parry – Oxitec experience in developing GM mosquitoes – engaging with regulators and stakeholders**

HP described his personal experience as an ex-member of staff of Oxitec of engaging with regulators and with communities in developing genetically sterile mosquitoes.

***Market and Regulatory Issues***

The market for this technology was entirely outside the UK in around 100 countries with the type of disease problem that it addresses and the regulations differ from one country to another, making it difficult for an SME to navigate. Oxitec's focus was on USA, Brazil, India and Malaysia.

The US regulatory system is 'vertical', based on the type of product (food, plant protection, health care) whereas in Brazil it is 'horizontal' in that all GM products are considered first by the National Biosafety System and then subsequently they have to go through a vertical system depending on whether they are classed as a food or a health care product.

In the US, the product didn't fit the regulatory system.

- In 2008-9 the UDSA had produced a favourable environmental impact statement on their technology
- Following a Dengue fever outbreak in Florida in 2009, they wanted to trial the technology there, but no agency would accept jurisdiction over it.
- In 2009 the USDA accepted jurisdiction because of its competence in the area.
- 2 Years later, the USDA said they did not, after all, have jurisdiction over the technology.
- In 2011, the Florida Department of Agriculture and Consumer Services agreed to consider it and then it was reluctantly adopted by the FDA.
- It then took 2 years to get a Memorandum of Understanding with the other agencies to carry out regulatory oversight.
- In 2014 there was a chikungunya outbreak in the Caribbean, followed in 2015-16 by the zika outbreak.
- In 2017, the USDA said that the regulator should be the EPA and the dossier has now moved across to them.

Each of these changes over a 10-year timeline has involved re-starting the clock and the burden of proof and regulatory criteria are different in different agencies.

Although regulatory systems start off with a scientific review, they generally get more and more politically influenced as a product gets nearer to market. Even where there are statutory time lines they can stop the clock and use it against the company. It is therefore almost impossible for small companies to raise finance and they find themselves trying to develop a disruptive technology against massive inertia in the system with no help.

Three factors are necessary to get to a market: (i) political top cover (a senior minister in government); (ii) a budget in the country; and (iii) a regulatory system that works. Poorer countries are even further behind in the development of regulatory systems than the US which means that the areas in most need of the technology are least likely to get it.

***Community and stakeholder issues***

Access to local communities is a very important factor in getting acceptance of the technology and, even though this is a health-related application, it has encountered significant anti-GM lobbying. "The antis" in this case are usually developed country activists, well-funded and coordinated, with a

history in anti-GM crop campaigns. Their beliefs may be genuine but they are motivated by money in the form of recruitment of pressure group members and attracting donations. Key players in this case have been GeneWatch, Friends of the Earth (USA) and Food and Water Watch.

The following tactics have been employed by "antis" in opposing field trials of Oxitec's GM mosquitoes, mediated through clever use of social media:

- Demanding a full regulatory package including evidence on human and environmental safety in advance of getting permission to do a field trial (a logical impossibility);
- Using the regulatory system to delay development with challenges related to a company's profit motives, moving too fast, the need for more data, conspiracy theories; and
- (Most important) lack of transparency.

Campaigning tactics experienced included a combination of direct attacks attempting to close the company down along with media campaigns based on false information:

- Blanket press releases in well-placed media, local and national;
- Release of investigative dossiers (e.g. GeneWatch 60 page report on Oxitec, well written and apparently well referenced, although the references are usually dead links or not relevant to the issue);
- Intense lobbying of politicians and conduct of local petitions;
- Use of home market criticism, e.g. claims that this would need UK Government support even though the product is not relevant to the UK and could not scientifically be tested in the UK;
- Non-evidential or quasi-evidential argumentation;
- Avoiding face-to-face discussion;
- (Where approval for open release had been granted) well-funded legal challenges, including flying in a highly paid barrister from the UK, creating significant delays, although not a change of outcome;
- A group of activists held a meeting in a rented room in Panama University then sent out a press release critical of Oxitec purporting to come from "a group of experts at Panama University";
- Creating a rumour that the emergence of the zika virus was caused by the release of Oxitec mosquitoes;
- GeneWatch challenged the use of an antibiotic to restore fertility to mosquitoes to enable them to reproduce for commercial use, claiming that antibiotics were not allowed in animal feed and mosquitoes are animals – defended successfully but caused delays;
- Challenging the use of a feed additive that was not approved for mosquitoes; this tied up significant staff time to find another effective additive;
- Using items from Oxitec's regular newsletter to launch freedom of information requests, e.g. to the UK Foreign Office asking whether they had helped the company's work in a country like Panama and if so how.

Despite these challenges, Oxitec has managed to maintain a positive company culture. It has conducted trials in Cayman, Brazil, Malaysia and Panama. The mosquitoes are now approved for release, but not for sale, in Brazil. They had a favourable public referendum result in Florida on approval for a release, in all districts except the two where the releases were to take place (both the subject of intensive lobbying from local antis). They have had recent strong support from the WHO – a positive recommendation for use. Their ability to remain in business in the face of such attacks depended on funding from business angels; they would not have been an attractive investment for venture capitalists.

The company's communications approach has been: to lead from the top; have everybody in the company trained in media presentation; keep a database on pro-and anti- journalists in different countries; inform impartial journalists about their work; never turn down an interview; ensure that

the science behind their work is of the highest quality; and inject an element of consumer choice where possible.

Discussion focused on how small companies should deal with such challenges, with the suggestion that this needs to be tackled at government level to prevent them from stopping the development of useful and safe technologies. It will not be possible to change the minds of activists, but the aim should be to win the debate with the majority of citizens.

**5. Jonathan Napier – genetically modified (GM) and genetically edited (GE) camelina – research at Rothamsted**

JN explained that although Rothamsted Research is a publicly supported research institute, its experience in the development of products based on genetic modification and gene editing was similar to that of Oxitec, although GM research is now more on the periphery of Rothamsted's work than it has been in the past.

***GM camelina***

The GM omega-3 fish oil project began in the 1990s, intending to deliver the consumer benefits of this product and also to reduce the pressure on marine resources, using genes from algae. The pathway is complex involving multiple steps and multiple genes and a new host chassis, camelina, which used to be the main oilseed crop in Europe up till the 1920s and is easy to engineer. The introduced genes are only expressed in the seeds and not in the rest of the plant. There is no computer programme yet that can predict how the complex combinatorial assembly of genes will work without trying it in practice so it took 15 years, up to 2013, to get to the point where omega-3 oils can be made in plants to the levels found in fish oils.

Moving on to GM field trials, Rothamsted already had experience of some of the pitfalls of conducting such trials based on its development of a wheat variety intended to repel aphids. They were able to learn from the experience of the focused NGO activity that occurred with this product. For the GM camelina trial they had excellent communications, ensuring that press articles were accurate and letting journalists know when they had been wrong. However, because of the threats to vandalise the field trials, the site is heavily fortified and this is seen as giving a very bad impression to the public

***GE camelina***

French colleagues who had developed a GE camelina variety had asked the Director of the French regulatory body for permission to do a field trial but this was refused. JN then offered to do the trial at Rothamsted as part of his on-going trials. DEFRA approved this course of action but advised against including GE plants within an application for a GM field trial, on the grounds that GM and GE were not seen as the same thing. At the time of this decision the expectation was that the European Court of Justice (ECJ) would confirm that GM and GE should not be treated similarly for regulatory purposes. However, DEFRA's advice to include the GE plants within the GM trial was wise given that the ECJ ruling did not go as expected, and Rothamsted were then able to continue with the trial. In next year's trial, the GE plants will have to go through the full GM approval process. There is concern that people will stop using GE tools because of this ruling.

***Feeding trial with salmon***

A trial of the feed produced from GM camelina, undertaken in a sea loch off the West Coast of Scotland last summer, resulted in opposition from the Scottish Government and a large number of Scottish regulatory agencies, including the Scottish Food Standards Agency and the salmon producer organisations, on a scale not seen in England, and the trial had to be stopped.

***Discussion***

Discussion covered both case studies presented at this meeting, focusing on the severe difficulties they experienced in the translation process from basic scientific research to market readiness in both the EU and the USA. The hope was expressed that, following the ECJ ruling, the EU would respond positively to pressure from the scientific community and others to adapt the GM Directive itself to the needs of GM, GE and other innovative biotechnologies. Attention was drawn to the letter from the GSG and SBLC to Lord Henley on the opportunities for related UK regulatory adaptation in future.

One perspective was that, as the ability to precisely delete genes with no additional chromosomal modifications has existed for decades, and that regulatory agencies globally have agreed that this constitutes genetic modification, the use of CRISPR/Cas9 merely improves gene editing. It is therefore logical to conclude that the new generation of GE organisms should be treated similarly. The movement within the biotechnology community to separate GE from other forms of GM has the potential to damage the industry by driving a wedge between gene editors claiming that their products are safe and those who are adding genes, with the implication that they are doing something risky. Everyone involved in GM (including GE) should present a united front to regulatory agencies to ensure that future development of all bioengineered products is not adversely affected.

The need for a strategic approach was emphasised, potentially developed through the SBLC and the GSG, to provide support for those developing innovative products and processes in these areas. All of the burden of negotiating these complex and difficult regulatory processes should not fall on the resources of a single, often small, company. In the absence of having a well-funded industry association to do this, an alternative form of collective action is needed to support the companies that are pioneering the development of often-disruptive innovations – this task should not be left to isolated individual actors. The following components of an effective strategy were identified:

- Provision of financial support to assist SMEs in negotiating the regulatory system;
- Development of a directory of expertise that companies can call on for support;
- A targeted communications campaign to draw attention to the potential public benefits (avoiding over-use of marine resources in the case of Camelina; better disease control in the case of Oxitec mosquitoes), making a difference to how these developments are perceived.

**Action 3: JT & LC to raise with SBLC the need to develop a strategic approach to regulatory issues in the context of deliberate release of products developed using SB and GE**.

**6. AOB**

AC (for HSE) provided an update on the Biosafety Strategic Leadership Group (BSLG) on laboratory contained use, set up to support safe innovation (slide presentation attached with these minutes). (LC and JT contributed to this initiative as featured in the HSE Bioeconomy Sector Strategy (http://www.hse.gov.uk/aboutus/strategiesandplans/sector-plans/bioeconomy.pdf). The BSLG is currently working on membership and has set up two workstreams around (i) competence and (ii) sector performance. Safety, particularly high consequence, low probability events, is critical in that part of the bioeconomy space.

HSE are looking to make connections with other groups, including SBLC and the GSG, as they take work on this forum forward.

**Action 4: LC and JT to engage with AC to explore future links with SBLC that could support this initiative.**