

# BioSB Programme Review Meeting Report

Congrescentrum De Werelt, Lunteren (NL), 3-5 April 2017

## Contents

1. Participants-----	1
2. Executive Summary-----	2
3. Background-----	3
4. Courses-----	4
5. Meetings-----	5
6. Vitality-----	5
7. Viability-----	6
8. Metrics-----	8

## 1. Participants

### Review Committee

Boris Kholodenko, Rapporteur (University College Dublin, IE)

Emmanuel Barillot, Institut Curie, FR

Teresa (Terri) Attwood, Scribe (University of Manchester, UK)

### BioSB Representatives

#### **BioSB Board:**

Jaap Heringa, Chair (VU, DTL Education, HoN ELIXIR-NL)

Barbara Bakker (UMCG)

Lodewyk Wessels (NKI, Chair TUD)

#### **BioSB office:**

Celia van Gelder (Education Manager BioSB, Programme Manager DTL Learning/ELIXIR-NL Training)

Femke Francissen (BioSB Conference Organiser and Course Support)

**Education Committee, Chair:** Jaap Molenaar (Wageningen UR)

**Scientific Advisory Committee, Chair:** Bas Teusink (VU)

**Scientific Committee:** Marcel Reinders (TUD)

**PhD Committee, Chair:** Joske Ubels (Erasmus MC, UMC Utrecht and SkylineDx)

## 2. Executive Summary

The Review Committee congratulates BioSB for doing a great job in the provision of courses generally, and in community building in bioinformatics and systems biology, in particular, which we recognise isn't easy. Overall, we consider BioSB to be **a unique programme of national importance and relevance** – indeed, '*a National Treasure*', of which BioSB members should be proud. The conference is increasingly successful, and young researchers are active and motivated – these developments are particularly impressive, *especially in light of the fact that much of the work is done on a voluntary basis*. For the future, we offer the following recommendations:

1. We support the aim to include courses in 'big data', data stewardship and statistics. Where feasible, we recommend continued alliances with CODATA-RDA, GOBLET and ELIXIR, and, especially, alignment with the training goals and education programme of DTL/ELIXIR-NL.
2. New courses in proteomics, 'basic bioinformatics' and other **niche topics** could bring new audiences. Here, we recommend maintaining links with DTL and the GO-TRAIN IN.
3. To understand the most urgent needs amongst researchers in the Netherlands, we recommend reviewing ELIXIR's training surveys, or to survey the Dutch bioinformatics and systems biology communities directly, and shape training provision accordingly.
4. Including 'e-learning' components in BioSB's portfolio makes sense, if it can be done cost-effectively. To help inform BioSB's approach, we suggest continued involvement with ELIXIR's e-learning sub-task.
5. Regarding metrics, we suggest alignment with the evaluation process being shaped in ELIXIR. We recommend careful consideration of 'ELIXIR branding', to help course visibility and 'perception of quality', and alignment with the ELIXIR/Bioschemas/GOBLET standards for training materials/courses, to signal BioSB's commitment to deliver high-quality training.
6. The 'hot topics' format seems agile, effective and well received. Where topics are less well covered (e.g., bioimaging), we recommend exploring links with DTL/ELIXIR.
7. BioSB is managing the competing interests of the bioinformatics and systems biology communities well. In future, we recommend reviewing the participant list of BioSB 2017, and targeted outreach to research groups whose interests aren't currently represented.
8. We suggest greater levels of PR to help increase awareness of the conference and of BioSB's courses – **BioSB needs to better articulate what it has to offer**.
9. BioSB has created **a conference for, and inclusive of, young people**. This is a unique selling point that could be used to draw in more early-stage researchers in future. Continued close work with YoungCB should help to keep the conference 'young'.
10. Considering BioSB's financial model, we suggest i) reviewing course charges across ELIXIR, which may help to finesse BioSB's current fees, and ii) slight alteration to the differential between member- versus non-member conference fees, which could help to incentivise more researchers to become members. It may be worth considering whether links can be made to other Research Schools, or whether sustainability lessons could be derived from the most successful Schools?
11. We suggest giving further thought to the membership model – having attributes of a Society and a Foundation may be an obstacle to growth. Getting organisational buy-in could help BioSB's viability, as organisations tend to have deeper pockets than individuals, who currently bear the full costs of membership. We particularly recommend considering how to create closer ties with universities, to become the '*school of choice for training*'; this could potentially bring 'in kind' support, and opportunities for joint grant funding. DTL could play an important ambassador role here.
12. If direct industry membership isn't feasible, we recommend exploring other methods of engagement (e.g., targeting past PhD students who've gone into industry).
13. BioSB is **a paradigm for national training**. We recommend approaching ELIXIR to determine the scope for investment in national initiatives such as BioSB represents.
14. We suggest using the results of reviews such as this to make a case to funding bodies like NWO for the financial support of programmes that can demonstrate clear strategic national importance.
15. We suggest that a review of this sort should be conducted about once every 3 years.

### 3. Background

BioSB is a Research School serving two different but related communities – bioinformatics and systems biology – and has a particular focus on education and community building. The School was established in 2014, essentially as a follow-up to, and ultimately merger of, national initiatives in bioinformatics: the Netherlands Bioinformatics Centre (NBIC) and the Netherlands Consortium of Systems Biology (NCSB), predecessor of SB@NL. Start-up funds (€56k each) from SB@NL and the Netherlands Bioinformatics Centre (NBIC) in 2015 seeded BioSB's initial activities, in particular the joint BioSB conference.

BioSB was created as a democratic member organisation. In its current membership model, PhD students pay €500 per annum (benefitting from free courses and a reduced conference fee), and academic researchers pay €300 per annum (with the benefit of a 50% reduction in fees for Introductory/Core courses, and reduced fees for Specific courses and conference attendance). For courses, non-member PhD students pay €100 per day, academics €75/150 per day, and industry €250 per day. With this model, BioSB isn't yet breaking even.

Following a stream-lining exercise, the governance model now includes a Board (whose current officers are named above), an Education Committee, a Scientific Advisory Committee and a PhD Committee (organised by the PhD students themselves who, as 'YoungCB', represent the Netherlands Regional Student Group of the ISCB). The Board and Committees are the elected representatives, and hold the delegated authority to act on behalf of the Assembly of Members, which has full voting rights.

The first Assembly took place in 2016, where it was decided to solicit an international review. This is important, as the funding situation within the Netherlands changed significantly in 2013, with impacts to research centres and universities, and knock-on viability challenges for BioSB. As a young organisation, with inevitable 'start-up' issues, BioSB's ability to maintain its current niche – and the role it plays for its two communities – now critically depends both on the ongoing support of these communities, and on the articulation of a sustainable funding model. This review provides opportunities to scrutinise and evaluate BioSB's 'existential challenges' from an international perspective, and for BioSB's Board to receive feedback and advice on next steps.

Accordingly, on 3 April 2017, the Review Committee (composition noted above) met members of the BioSB Board and Office (staff also noted above), together with representatives from the Scientific, Education and PhD Committees, in order to evaluate BioSB's efforts to establish a sustainable, high-quality research school serving two communities. The Committee was asked to offer advice and guidance on BioSB's education programme, with particular regard to its viability, focus, organisation and future directions.

During the afternoon, following opening presentations from Jaap Heringa and Barbara Bakker introducing BioSB and its governance structure, short overviews were given by Lodewyk Wessels on the BioSB conference and community, by Bas Teusink on the role of the Scientific Advisory Committee, and by Joske Ubels on the activities of YoungCB. Subsequently, Celia van Gelder and Jaap Molenaar spoke on behalf of the Education Committee; and finally, Celia, Jaap (H), Barbara and Lodewyk concluded with an update on BioSB's finances and sustainability. The presentations are available here: <https://drive.google.com/open?id=0BzM1gRKqgl2NV2tnSXBfU3NaVm8>

Reflecting on the preliminary documentation provided to the Committee, the oral reports during the meeting and the discussions that followed, this report looks particularly at BioSB's course provision, its meetings, vitality, viability and metrics for success.

## 4. Courses

The BioSB Education Programme covers core topics across the diverse fields of systems biology and bioinformatics, which are arranged into three educational tracks: Introductory, Core and Specific courses. Introductory courses, held once a year, are free to PhD students and have a reduced fee for PI members of BioSB. Core courses, held every two years, are also free to PhD students, with reduced fees for PI members. Specific courses are mostly co-organised with other bodies, and the fee model is consequently less straightforward.

Overall, the Committee is impressed with the range of courses and the attempt to create a portfolio that complements existing programmes from universities. A substantial part of the field is covered – it's clearly not possible to cover all of it; nevertheless, it's important to review the curriculum and consider gaps. The Committee is supportive of the aim to include additional courses around important subjects like 'big data' and data stewardship, and especially the goal to include statistics (noting that there might be potential here to develop alliances with CODATA-RDA in the context of their annual Data Science Summer School, and to build on existing relationships with GOBLET and ELIXIR – the latter, in particular, has a formal Training Platform for roll-out of training to, amongst others, researchers, who recently highlighted statistics as a key training need).

Recent technological developments in mass spectrometry, *etc.*, suggest that there may be opportunities to be explored in proteomics, which could bring new audiences; building on links with the Dutch Techcentre for Life Sciences (DTL) might be worthwhile in this context. It may also be worth exploring whether there are particular ***niches to be developed*** that do not currently sit completely within BioSB's focus – this too might open up new avenues. Specifically, it might be worth considering the provision of a course or courses on 'basic bioinformatics' if these are not already available from universities. Universities are likely to offer introductions to biological databases (GenBank, UniProt, *etc.*) and to their associated software tools (*e.g.*, BLAST), but few are likely to dig deeper into critical concepts that underpin them, such as data provenance and annotation. In light of the growing importance of data stewardship, this could offer a valuable new twist to introductory bioinformatics programmes not offered elsewhere, and is particularly relevant in light of the emerging GO-TRAIN Implementation Network (IN), in which the Netherlands (DTL) is a key player.

Synthetic biology of microbial and mammalian cell systems might be other avenues to explore in future, when the fate of the school is more assured. In terms of course content, care would have to be taken to focus on the computational aspects, to differentiate BioSB's provision from existing courses (*e.g.*, from established synthetic biology groups in the Netherlands). Including courses in new areas will ultimately be made easier by building bridges with other relevant communities.

Attendance is still relatively low for some courses, which may be a consequence of several factors, including BioSB's membership model, wider structural changes across education programmes in the Netherlands (offering students more choice), or other specific issues. However, the Committee feels that, despite the current low attendance (12-30), it is nevertheless sufficient to justify holding these courses, as there are still many opportunities for growth as BioSB evolves and matures.

Face-to-face courses aren't the only way to deliver training, of course. Blended approaches, incorporating online components, and/or full 'e-learning' (howsoever it might be defined) modules have been popular for some time. As Systems Biology has developed a number of well-received e-learning courses, it makes sense to include aspects of e-learning within BioSB's portfolio. However, the ability to embrace e-learning fully is only likely to be feasible if it can be done in a cost-effective way. The Netherlands has a strong track record in developing e-learning resources, but doing this well, and sustaining the provision, is costly –

it depends on having the right teams with the appropriate software, graphic design, usability and educational skills, and sufficient funds to sustain them. If this can be achieved by working with other groups (where perhaps those teams are already present), this could help to provide 'quick wins'. ELIXIR has an e-learning sub-task, where these issues are being explored. Continued involvement in those discussions will clearly be important.

## 5. Meetings

BioSB currently organises an annual bioinformatics and systems biology conference, which is growing in popularity each year – this year, attendance topped 400, not far off 100 more than last year. BioSB was also heavily involved in the joint organisation, with DTL, of the highly successful ECCB 2016 in The Hague. The Scientific Advisory Committee also organises workshops and 'hot topics' meetings at both national and international levels (e.g., in the context of conferences like ECCB).

The Committee feels that the 'hot topics' format seems agile, effective and well received. Some topics have, perhaps, been less well covered, such as bioimaging and biotechnology. But bioimaging groups already exist at national and European levels (e.g., NL Bioimaging in DTL, ELIXIR), and it would be good to explore those links.

The conference, as already mentioned, is becoming increasingly successful, and is likely to continue to grow. It will always be challenging to balance the 'competing interests' of the bioinformatics and systems biology communities, but the Committee feels that BioSB is managing this well and, overall, has created an effective conference format. It's possible that some research groups still overlook the conference in favour of international meetings; hence, future outreach to them might help to bring the BioSB conference to their attention.

A particular strength of the conference is its air of informality and its excellent mix of established academics and young researchers, which helps to keep the meeting vibrant. Indeed, the balance of young to established researchers is particularly impressive: if this balance can be sustained, the BioSB conference will have done something that ISMB still struggles to achieve, which is **to create a conference for, and inclusive of, young people**. This is incredibly refreshing and must be congratulated – it is a unique selling point that could be used to draw in even more early-stage researchers in future, especially if the conference is competitively priced. The core role of YoungCB, embedded as it is within BioSB, is hugely valuable. Their involvement in the conference helps to foster a fresh and lively atmosphere; BioSB consequently benefits enormously from their presence, and should continue to work with them to keep the conference 'young'.

## 6. Vitality

There is no doubt that BioSB provides a vibrant and stimulating environment for its members – the increasing success of its conference is one measure of this. In our view, the committees cover the required topics.

With regard to national and international collaboration/partnerships, BioSB has already done a great deal in this area, being actively engaged in or in discussion with organisations like DTL, ELIXIR, GOBLET and CODATA. A specific recommendation of the Committee is to consider approaching ELIXIR to determine the scope for investment in national training initiatives, such as BioSB represents within the Netherlands. We consider BioSB to be **a paradigm for national training**, exactly the sort of programme that ELIXIR's training infrastructure could support – or at least discuss – within the scope of its Training Platform.

A significant challenge for BioSB – and presumably for all of the life-science-related research schools – is the way in which PhD programmes are evolving across the Netherlands. Students are now able to 'shop around' more, and this might be one reason

why it's hard to get them to commit to one particular school from the 50 or so life-science research schools that now exist. This is perhaps one argument for BioSB to try to create closer ties with universities, to become the '*school of choice for training*' (rather as the EBI Bioinformatics Summer School has become the go-to School for many UK Masters and PhD programmes; and the CODATA-RDA Data Science Summer School is being built with similar goals in Trieste). A related question would be whether there is mileage to be gained by creating closer ties with other Research Schools – could there be some synergies there? Are all of the Research Schools sustainable? Are some more successful than others – if so, what distinguishes them? Can lessons be learned from those that are most successful?

Making BioSB more 'attractive' to, and forming close relationships with, particular universities (not least when there are so many other 'competing' Schools) might be advantageous. Building the right kind of relationship could yield 'in kind' support – even at the level of a day per week, this could have a significant impact on BioSB's ability to operate smoothly. Were BioSB more intimately embedded within a university framework, it might be possible to seek other types of funding, such as Marie-Sklodowska Curie ITNs. That said, as a legal entity in its own right, BioSB can, of course, also partner in such schemes anyway. Exploring such funding opportunities together with universities might be worthwhile in future.

## 7. Viability

The organisational structure seems appropriate, and is certainly more streamlined (with fewer committees and boards), and is hence in all likelihood more efficient than it was in the original 'vision document'. Advice from industry is clearly important, and, for now, is probably better embedded within the relevant BioSB committees rather than trying to capture it within a separate industry platform. Creating a separate body creates additional overheads, and risks greater isolation of industry views from the day-to-day activities of the Education and Scientific Advisory Committees. Established institutes like the EBI and larger European initiatives like ELIXIR do have Industry Programmes; it might therefore be worthwhile maintaining dialogues with them, to explore which model works best in the longer term. Meanwhile, perhaps the industry network of NBIC (the BIUP platform) could be exploited, if it's still functional?

The current target community of bioinformaticians and systems biologists is appropriate, and reflects how these subjects are being interwoven in research and education programmes in other countries (e.g., in recent years in the UK, Manchester's Bioinformatics MSc course transitioned to an MSc in Bioinformatics and Systems Biology; and Birkbeck, University of London now offers both Bioinformatics with Systems Biology MSc and MRes programmes). It could be argued that broadening the scope of BioSB could help to increase membership, but *this runs the risk of losing the focus and the very community that BioSB has worked so hard to cultivate*. Nevertheless, it might be worth reviewing the participant list of BioSB 2017 to see whether there are research topics missing. Some groups might overlook the BioSB conference if their particular research area is not obviously represented; if there are such research groups, these could be targeted proactively.

Another important consideration is which are the most urgent training needs amongst researchers in the Netherlands. One obvious question is whether any answers can be found within ELIXIR's surveys of training needs? If not, perhaps the Education Committee should itself create a survey to ascertain this information directly from the Dutch bioinformatics and systems biology communities (as an aside, GOBLET's surveys asked about training needs and the mode of training delivery that respondents preferred – BioSB could perhaps do something similar, including questions on preferred fee structures)? Providing an agile education programme, responsive to current training needs, is a

challenge; nevertheless, it is essential, to avoid stagnation, and rolling out courses that are comfortable and easy to deliver, but are actually no longer meeting the most urgent needs of the community. Going forward, it will be important for BioSB to understand its audience, and to reshape itself, if and where necessary, to adapt to any changes it finds.

The financial sustainability of BioSB is clearly an issue, one that needs further work. The ambition not just to continue to sustain the baseline but to grow the programme is laudable, but is probably the biggest challenge. Ideally, additional personnel are needed, but the current funding model makes this difficult to achieve in the short term. Part of the problem is that the membership model confronts a major 'cultural obstacle' within the bioinformatics community, which has traditionally expected resources (including training) to be freely available (this is not just a specific problem of the Netherlands). Nevertheless, researchers in the field of bioinformatics *do* pay high conference fees (ISMB, for example, is expensive to attend – early-bird registration fees for ISMB2017 range from €530 (student) to €725 (PI) for members, and €667 to €945 for non-members) and/or course fees (e.g., the Wellcome Genome Campus Advanced Courses, which charge as much as £1,040 (€1,214) for week-long residential courses); so fee payment shouldn't be regarded as a barrier to success *per se*. The Education Committee could perhaps consider reviewing the course charges across ELIXIR, which might provide evidence to help finesse BioSB's current course-fee model.

Another potential 'cultural' challenge posed by the current model is that BioSB appears to be something of a hybrid between a Foundation (Stichting) and a Society. This is a potentially important point: members of Societies are accustomed to paying (relatively) modest annual fees, for which they receive a range of benefits (including reduced conference fees, discounts on courses/tutorials, access to travel bursaries, regular newsletters, *etc.*). However, in general, they have limited ability to influence the day-to-day direction of the Society itself, a responsibility they *delegate* to an elected Board of Directors/Executives. Members of Foundations, by contrast, have direct influence on the organisation's core business, having rights to vote not only on the operational executive posts but also on matters of day-to-day practice, strategy and governance. It might be worth the Board giving some thought to this 'identity crisis', as this could have a bearing on future membership growth: Societies generally appeal to individual professionals and students (who are both fickle and have relatively shallow pockets); Foundations are likely to have more appeal to organisations (which are generally more conservative, but have deeper pockets). BioSB currently seems to be caught between these two types of membership model, which might be a general cause of confusion, and an obstacle to future growth. Organisation-level buy-in, although tougher to achieve, could help to alleviate the pressure on individuals (PIs/PhD students), for which the annual costs seem relatively high in the current model. We recommend giving careful thought to this.

In a similar context, the Committee also recommends exploring 'industry memberships', which could significantly boost income. If there is resistance from industry to pay membership fees, this might require further thought about how to engage them in other ways. For example, it might be possible to track the 5-year careers of past PhD students – those who've gone into industry could then be targeted. Industrial sponsorship might also be worth seeking, but is not a solution to the budget problem – at best, it will be a partial solution. Sponsorship has already been secured for the conference; this is to be pursued, but it isn't a long-term solution for BioSB's viability.

In the current financial climate, one strategic suggestion would be to work more closely with DTL. Importantly, DTL is an umbrella organisation via which universities could be reached. Gaining membership 'buy-in' at **university level** would be extremely valuable (*i.e.*, such that responsibility is not simply handed off to individual PIs) – in this context, DTL could play

a vital ambassador role. Equally significantly, it is the Dutch Node of ELIXIR and, as such, has training goals and a 'lean and mean' education programme of its own – close alignment with DTL/ELIXIR-NL therefore makes sense, particularly if some aspects of the workload can be shared. In addition, the conclusions of this review, and of future reviews, could be used to lobby bodies such as NWO, to help make a case for the financial support of programmes like BioSB that can demonstrate clear strategic national importance.

One important observation emerged during the review: namely, that gaining a full overview of final budgets has been difficult. It has consequently become clear that greater transparency is required in the financial administration, and this should be addressed as a matter of some urgency.

Around the world, we have witnessed a squeeze on the landscape of research and education funding. While this situation prevails, the best strategy is diversification. Overall, greater levels of PR might help to increase awareness of the conference and of BioSB's courses, and ultimately help to attract greater numbers of participants – **BioSB needs to better articulate what it has to offer**. Additionally, one small parameter to consider in future financial models could be a slight alteration to the differential between member-versus non-member conference fees – this wouldn't have a detrimental effect on current members, but might provide an incentive for further researchers to become members in future. Regardless, as the conference continues its successful trajectory, hopefully more researchers will see the benefit of becoming members anyway!

## 8. Metrics for success

With regard to evaluation, the Committee is pleased to see that the quality of courses is monitored, and that student feedback is taken seriously. To take steps beyond course and conference feedback, one suggestion would be to review the evaluation process currently being shaped within ELIXIR, and perhaps to align more closely with that. It could also be worth considering the extent to which 'ELIXIR branding' might be appropriate, and whether this could help with course visibility and 'perception of quality'. Similarly, the Committee would encourage the Education Committee to align with the ELIXIR/Bioschemas/GOBLET standards (as they emerge) for training materials and courses, to signal BioSB's commitment to continuously deliver high-quality training.

Beyond the above observations, the Committee has no specific suggestions for other metrics to include at this stage. Metrics are often invidious: the data are generally time-consuming to collect and analyse, and tend, at best, to be tangential proxies for the things they're supposed to measure. Continued monitoring of the growth in membership, and in course and conference attendance, will be good indicators of whether BioSB is moving in the right direction and making a positive impact on its finances.

Reviews like this involve a lot of work for many people, and are seldom popular, especially if they happen too often. Nevertheless, they offer a useful platform for self-reflection and improvement. Clearly, a balance is necessary. The Committee suggests that a review like this one should be conducted around once every 3 years.



B.Kholodenko



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