

RSB response to Professor Sir Adrian Smith's call for evidence on future frameworks for international collaboration on research and innovation

May 2019

Background: The Royal Society of Biology (RSB)

The Royal Society of Biology (RSB) is a single unified voice, representing a diverse membership of individuals, learned societies and other organisations. We are committed to ensuring that we provide Government and other policymakers, including funders of biological education and research, with a distinct point of access to authoritative, independent, and evidence-based opinion, representative of the widest range of bioscience disciplines. We are pleased to provide this response, which has been informed by input from RSB Member Organisations and individual members across the biological disciplines.

This response is informed by detailed responses¹ to previous consultations and inquiries, as well as by discussions of the current challenges and opportunities.

Executive summary

- To meet the ultimate objective of 2.4% of GDP invested in research and development by or ahead of 2027, novel and supplementary public investment is needed in addition to, rather than instead of, current funding streams and association with EU programmes. The UK should incentivise multilateral or bilateral international collaborations with achievable funding opportunities. Alongside funding, support mechanisms to help research achieve impact are key; this is rarely achieved in the near term so mechanisms for longer term support would be welcome.
- Future frameworks should consider incorporating identifiably successful characteristics of current or past programmes but novel approaches will also be needed. Within this response we include some examples of successful approaches, this is not intended to be a definitive set and we would be pleased to engage further with this review.

¹ <https://www.rsb.org.uk/policy/consultations/consultation-responses>

Supporting internationally important discovery research and innovation:

1. Maintaining and expanding advanced research infrastructure alongside facilitating movement of people and funding will enhance research discovery:
 - a. To support the development of international partnerships, future funding arrangements must enable “movement of skilled workers between countries to help reduce skills gaps”^{2, 3}.
 - b. International partnership development also involves facilitating travel of the UK-based workforce. “To be world leading, researchers need to interact with the rest of the world. Many principal investigators at UK universities do not have the funds to travel to as many international conferences and meetings as their counterparts from other countries”⁴. To capitalise on opportunities as they arise, future funding frameworks should incorporate additional monetary support specifically for travel.
2. International funding mechanisms should facilitate relevant engagement with regulatory frameworks and networks.⁵
3. To support research discovery, future frameworks should support access to valuable resources and world-leading facilities that are not available in the UK, and which bring research groups together to share resources at scale, across disciplines. An alternative or additional funding approach must consider the needs of a range of disciplines across the life science sector, and try to enable researchers to gain access to the best available facilities, technology and training globally. For example, the H2020-funded Centre of Excellence in Computational Biomedicine (CompBioMed)⁶ involves 15 partners across industry, academia and medicine throughout UK and Europe who

² Response from the Royal Society of Biology to the House of Lords Science and Technology Committee inquiry into Life Sciences and the Industrial Strategy.

https://www.rsb.org.uk/images/RSB_response_Life_Sciences_Industrial_Strategy_inquiry_submitted.pdf

³ “Ease of movement for skilled people and trainees is an essential part of ensuring that science in the UK has the right mix of talents at any time, ensuring biosecurity and research continuity” Growing the future report.

https://www.rsb.org.uk/images/news/2019/UKPSF_Growing_the_future.pdf

⁴ Response from the Royal Society of Biology to the House of Lords Science and Technology Committee inquiry into Life Sciences and the Industrial Strategy.

https://www.rsb.org.uk/images/RSB_response_Life_Sciences_Industrial_Strategy_inquiry_submitted.pdf

⁵ “Continued collaboration and communication between UK regulatory agencies, European regulatory agencies, EU Reference Networks and the network of EU Reference Laboratories is crucial to enable maximum UK capacity for innovation, and efficient knowledge and resource sharing, with direct impact on public and animal health and welfare, and the economy” RSB response to the Science and Technology Committee of the Commons Brexit science and innovation Summit inquiry.

https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_Brexit_science_and_innovation_Summit_inquiry_for_submission.pdf

⁶ CompBioMed website: <https://www.compbioed.eu/>

develop the use of high performance computing for biomedical applications, including in cardiovascular and haemodynamic modelling⁷. The Centre brings together partners with access to some of the best facilities in the world. With EU funding, the team at UCL and other UK institutions, are able to access computers with the speed and memory needed for this work, located in Germany, Spain and the Netherlands.

4. Retention of skilled individuals at all levels is important⁸ and factors beyond the funding structures themselves will influence the success of investment in this regard. For example (a) supportive immigration policies, especially after the UK exit from the EU; (b) policies that support UK scientists to readily access equipment and knowledge exchange facilities (including conferences) locally and overseas; and (c) a supportive environment for movement between academia and business, and vice versa (balancing emphasis on publications/grant awards versus product development, and conditions of employment)⁹ will all influence research achievement.

Building the capability for internationally important research and innovation:

5. In order to attract excellent scientific talent to the UK, including early career scientists, funding mechanisms must nurture and develop, and build a reputation for success in this. Alongside funding, frameworks should support the UK organisation of scientific meetings, training and knowledge exchange between national and international communities to aid collaborations.
 - a. Changes associated with exiting the EU are likely to make certain international collaborations harder to initiate and maintain. Feedback from our community suggests this 'cooling effect' is already affecting research collaboration, both in terms of abandoned proposals and change in research consortium leaders and, potentially, outcomes. The uncertainty surrounding the manner of the UK exit is adding to this. Robust future funding arrangements must be developed quickly to "incentivise the influx of international talent by allowing foreign graduates trained in the UK to remain and use their skills in this country"¹⁰.

⁷ <https://www.compbioed.eu/home/clinical-users/>

⁸ The Royal Society of Biology, (2018) RSB response to the Science and Technology Committee of the Commons' inquiry on an immigration system that works for science and innovation.
https://www.rsb.org.uk/images/Policy/RSB_response_to_HoC_STC_An_Immigration_system_that_works_for_science_and_innovation_inquiry_for_submission.pdf

⁹ Response from the Royal Society of Biology to the Science and Technology Committee of the Commons inquiry on the Balance and effectiveness of research and innovation spending
https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_inquiry_on_research_and_innovation_spending_submitted.pdf

¹⁰ Response from the Royal Society of Biology to the House of Lords Science and Technology Committee inquiry into Life Sciences and the Industrial Strategy.
https://www.rsb.org.uk/images/RSB_response_Life_Sciences_Industrial_Strategy_inquiry_submitted.pdf

- b. Programmes such as UKRI Future Leaders Fellowship have acted to address some of the challenges faced by early career researchers but it is not in itself enough.
 - c. The potential loss of Marie Curie-Sklodowska post-doc fellows coming to the UK will need to be redressed - many recipients have gone on to lead research groups in the UK¹¹.
6. The UK is among the most active participants in the Erasmus+ scheme, in fifth position for sending students abroad; and in fourth position for receiving students according to an EU report¹². While Erasmus+ does not directly support international research collaborations, it guides talented students towards an international mind-set and equips them with skills later required for successful international collaboration.

Encouraging investment in research and development:

7. To contribute to the Government's target of 2.4% of GDP invested in R&D, private and inward investment must be successfully encouraged. Reviewing different disciplines and using evidence from researchers and others in business and academia can help identify target areas for development.
- a. "In order to maintain the current approximate ratio of private to public investment of 2:1 we will need to maintain the attractiveness of the UK environment for investment. A fiscal environment that encourages EU and global investment in UK R&D is essential to continue to encourage private investment which will contribute significantly towards the Government's"¹³.
 - a. Future funding frameworks should enlist evidence-based processes and consultation (including research communities and users of research) in order to consider trade-offs in needs – including how the legislative and regulatory environment in the UK meets the requirements of international partnerships to enhance research. For example, the EU court decision classifying genome edited plants as genetically modified organisms (GMOs)¹⁴

¹¹ "the Government should aim for the fullest possible participation in funding opportunities such as the Marie Skłodowska-Curie scheme" Response from the Royal Society of Biology to the House of Lords Science and Technology Committee inquiry into Life Sciences and the Industrial Strategy.
https://www.rsb.org.uk/images/RSB_response_Life_Sciences_Industrial_Strategy_inquiry_submitted.pdf

¹² http://ec.europa.eu/assets/eac/education/library/statistics/erasmus-plus-facts-figures_en.pdf

¹³ Response from the Royal Society of Biology to the Science and Technology Committee of the Commons inquiry on the Balance and effectiveness of research and innovation spending
https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_inquiry_on_research_and_innovation_spending_submitted.pdf

¹⁴ Organisms obtained by mutagenesis are GMOs and are, in principle, subject to the obligations laid down by the GMO Directive
<https://curia.europa.eu/jcms/upload/docs/application/pdf/2018-07/cp180111en.pdf>

potentially extends the current lack of commercial R&D investment in GM plant breeding within the EU. However, there could be significant UK opportunity.

Building collaboration, and development:

8. Overall, frameworks should encourage and recognise the best prospects for science and benefit.
 - a. “Continued access to EU budgets, frameworks, infrastructure and partnerships, including EuropeAid, Horizon 2020 and its successor programmes, and relevant funding programmes and frameworks” is preferred¹⁵. Being a full associate member of Horizon Europe remains the best case scenario. Furthermore, there must also be a sustainable future for UKAid, with an appropriate transition so that aid recipients are not disadvantaged”¹⁶.
 - b. Access to patients across the EU is required for many drug trials, especially for differing genetic backgrounds and rare diseases^{17,18}.
 - c. Future funding environments “must provide efficient and effective access to EU and global infrastructure, funding, skills and expertise at every level and stage of the research and development (R&D) cycle, from fundamental research to translation and application for societal benefit”¹⁹.
 - d. Development of any future UK research fund must take into account the needs of devolved nations, through effective, efficient and wide-ranging community consultation. This includes

¹⁵ For example: SME access to EU financial and “administrative assistance” in accordance with Commission Regulation (EC) No 2049/2005:

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32005R2049>

¹⁶ RSB response to the Science and Technology Committee of the Commons Brexit science and innovation Summit inquiry.

https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_Brexit_science_and_innovation_Summit_inquiry_for_submission.pdf

¹⁷ Royal Society of Biology response to the Science and Technology Committee of the Commons’ inquiry on Brexit, Science and Innovation: Preparations for a No-Deal.

https://www.rsb.org.uk/images/Policy/RSB_response_to_the_HoC_STC_Brexit_Science_and_Innovation_Preparations_for_No-Deal_for_submission.pdf

¹⁸ Royal Society of Biology responded to leaving the EU: implications and opportunities for science and research inquiry.

<http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/science-and-technology-committee/leaving-the-eu-implications-and-opportunities-for-science-and-research/written/36017.pdf>

¹⁹ Royal Society of Biology response to the Science and Technology Committee of the Commons’ inquiry on Brexit, Science and Innovation: Preparations for a No-Deal.

https://www.rsb.org.uk/images/Policy/RSB_response_to_the_HoC_STC_Brexit_Science_and_Innovation_Preparations_for_No-Deal_for_submission.pdf

the need to build regional research capacity to the level of international competitiveness. The proposed UK Shared Prosperity Fund will be crucial in developing research strengths in UK nations following on from the current EU Structural Funding support.

Building individual success, discovery, innovation, impact and infrastructure:

9. Discovery research is essential to advance scientific understanding and knowledge, broadly. Mechanisms to provide both funding and access to facilities internationally are essential.
 - a. “Fundamental research increases understanding of ourselves and the world around us and is often the source of breakthroughs that lead to new products in ways that cannot be predicted or commissioned. It is important that the portfolio of publicly funded research achieves a balance of fundamental, translational and applied programmes”²⁰.
 - b. “Our members have highlighted the importance of developing and sustaining investment and access to infrastructures and facilities that support basic and applied research, for example: biological resource collections; reference and high-containment laboratories; and databases and cloud infrastructure for genomic and other data. Investments and funding agreements should recognise that for laboratory facilities to function, baseline of funding and income is needed – building in long-term support for maintenance, development and training”²¹.
 - c. The UK has a history and international reputation as an important centre of long-term data collection, in environmental monitoring and other areas. It is important that data collection is continually supported and that the UK does not lose its advantage and international contribution in this area. Some of these areas may not appear progressive but they fundamentally support discovery and impact.

Balancing domains and disciplines:

10. A strategy to comprehensively maintain and support skills and capacity across the breadth of life science from molecular biology to ecosystems, and in intersecting disciplines, is vital. Of allied importance is the interface with social science. This must not be overlooked. Funding frameworks should be responsive to excellent opportunities that arise. Eligibility for excellence-focussed EU funds would be likely to be lost in a no-deal Brexit scenario. This would be a real challenge.

²⁰ Response from the Royal Society of Biology to the House of Lords Science and Technology Committee inquiry into Life Sciences and the Industrial Strategy.

https://www.rsb.org.uk/images/RSB_response_Life_Sciences_Industrial_Strategy_inquiry_submitted.pdf

²¹ Response from the Royal Society of Biology to the Science and Technology Committee of the Commons inquiry on the Balance and effectiveness of research and innovation spending

https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_inquiry_on_research_and_innovation_spending_submitted.pdf

- a. The RSB's advisory committee the UK Plant Sciences Federation recently produced the 'Growing the Future' report. This report highlighted how the field has thrived through collaborative and international research.²² The report highlights the importance of "involvement in multi-country research programmes as they provide mechanisms for collaboration, external funding and access to infrastructure that can deliver hugely ambitious projects,"²³ which is applicable to several scientific disciplines.
 - b. "The Global Challenges Research Fund (GCRF), which forms part of the UK's Official Development Assistance (ODA) commitment, is providing an increasing range of opportunities for plant research to benefit the least developed countries. Innovate UK and the Industrial Strategy Challenge Fund support the uptake of novel plant and crop science by industry to help bring innovations to market and deliver benefits"²⁴.
 - c. International development for livestock improvement is also in need of support for innovation and further research to not only manage biosecurity of produce coming to and from the UK²⁵, but also realise the potential positive impact of UK research internationally.²⁶
11. "In the context of international collaboration on agricultural issues, the UK has responsibilities for a global spread of overseas territories that in different ways have their own farming issues and will undoubtedly be affected by the UK leaving the EU. For example, some territories are geographically closely associated with the territories of other member states (e.g. Montserrat (UK) and Guadeloupe (France)). A proposed solution for the issue of how best to cater for the mutual needs of EU outermost regions and overseas territories (at present including UK overseas territories) might be to develop collaborative schemes on a regional basis for their mutual benefit"²⁷. Approximately 74 critically endangered species occur in the UK Overseas Territories (compared to 10 in mainland

²² Growing the future report.
https://www.rsb.org.uk/images/news/2019/UKPSF_Growing_the_future.pdf

²³ Growing the future report.
https://www.rsb.org.uk/images/news/2019/UKPSF_Growing_the_future.pdf

²⁴ Growing the future report.
https://www.rsb.org.uk/images/news/2019/UKPSF_Growing_the_future.pdf

²⁵ <https://bbsrc.ukri.org/research/international/engagement/global-challenges/zels/>

²⁶ Collaborative programmes such as The Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH) and Leveraging Agriculture for Nutrition in South Asia (LANSA) currently provide help, for example.

²⁷ Response from the Royal Society of Biology to Defra's consultation on "Health and Harmony: the future for food, farming and the environment in a Green Brexit"
https://www.rsb.org.uk/images/RSB_response_to_Defra_consultation_on_Health_and_Harmony_submitted.pdf

UK); 49 endangered species (12 in mainland UK); and 117 vulnerable species (37 in the mainland UK) showing clear need for environmental science communication and collaboration,²⁸.

12. The provision of some sector-specific funding, such as IUK grants and the Biomedical Catalyst, can send a signal and provide assurance to national and international investors that the sector will have access to long-term dedicated funding for excellent projects.

Providing support for collaboration at different scales:

13. New funding arrangements will inevitably take time to establish and there is a significant risk of a partial hiatus in research momentum if currently-accessible international funds (e.g. Horizon programmes etc.) are unavailable. Such a lull would have long-term implications and so the earliest development of even interim funding arrangements would be an advantage, while establishment of long-term mechanisms proceeds at the appropriate pace to deliver an internationally prestigious and leading framework and fund.
14. Current EU funding encourages industry collaboration at a much earlier stage than many current UK funding programmes. There is also considerable support available for working with small and medium-sized enterprises (SMEs), as well as developing spinouts and start-ups from the project. Future funding frameworks would need a tailored strategy for provision of support to business of different size. Funding mechanisms should also actively seek to take advantage of the UK's strength across the charity and not for profit sector whose skills, knowledge and networks can underpin innovation.

Assessing and assuring the quality of research

15. Developing a substantial new international funding mechanism with necessary peer review would be an opportunity to apply existing careful learning about the best features of current and past UK and non-UK mechanisms, and measure against the UK aspirations to create a world-leading environment for researchers and research, including in the UKRI strategy and elsewhere.²⁹ It is an opportunity to design a system to promote a healthy research environment as an outcome.
 - a. Linking assessment with national and international initiatives such as The Declaration on Research Assessment (DORA)³⁰, [ARRIVE](#) guidelines on the use of animals in research, [Global Code of Conduct for Research in Resource-Poor Settings](#), etc., among others that

²⁸ <http://jncc.defra.gov.uk/page-4513>

²⁹ For example, The Nuffield Council on Bioethics (2016) [The culture of scientific research](#); UKRI (2018) [Strategic Prospectus: Building the UKRI strategy](#).

³⁰ The Declaration on Research Assessment (DORA) webpage; <https://sfedora.org/>

promote high standards of research and reporting, and healthy research culture, would be important to assure quality and build reputation and prestige internationally.

- b. RSB would be pleased to engage as the consultation develops, for example relevant to peer review systems which meet the needs of the community regarding unconscious bias, transparency and publications access, among other aspects.

Establishing and administering a research support framework:

16. Existing networks and programme approaches can be built upon. But there may not be the capacity to simply “link” a whole new funding framework.
17. A long-term resilient budget would need to be established to build reputation and allow commitment to multi-year grants. Such programmes must look well beyond the term of a single Parliament(s).
18. Whatever the mechanism it is clear that collaboration between the UK, other European partners, the US and countries across the world will be a cornerstone of the future success of UK science³¹, ³².

Associated issues:

19. Effective engagement with decision-makers and the public about funded research is important, including in the international setting. Understanding the context, regulatory environment, and potential group preferences would be important across collaborating or target countries. Incorporating and facilitating this expectation in projects would be an advantage.
20. Maintaining biosecurity is vital to protect our environment, economy, food supply chain and health, and those of other nations. Collaboration is essential for access to expertise, and for sharing. A biosecurity collaboration requirement applies to any research or trade partner.

We welcome the opportunity to comment on this important matter. The RSB is pleased for this response to be made publicly available. For any queries, please contact the Science Policy Team at Royal Society of Biology, Charles Darwin House, 12 Roger Street, London, WC1N 2JU. Email: policy@rsb.org.uk

³¹ World Economic Forum, (2015). Collaborative Innovation: transforming Business, Driving Growth. Regional Agenda. http://www3.weforum.org/docs/WEF_Collaborative_Innovation_report_2015.pdf

³² Response from the Royal Society of Biology to the Science and Technology Committee of the Commons inquiry on the Balance and effectiveness of research and innovation spending https://www.rsb.org.uk/images/article/policy/RSB_response_to_HoC_STC_inquiry_on_research_and_innovation_spending_submitted.pdf

Appendix: Member Organisations of the Royal Society of Biology

Full Organisational Members

Academy for Healthcare Science
Agriculture and Horticulture Development Board
Amateur Entomologists' Society
Anatomical Society
Association for the Study of Animal Behaviour
Association of Applied Biologists
Bat Conservation Trust
Biochemical Society
British Andrology Society
British Association for Lung Research
British Association for Psychopharmacology
British Biophysical Society
British Ecological Society
British Lichen Society
British Microcirculation Society
British Mycological Society
British Neuroscience Association
British Pharmacological Society
British Phycological Society
British Society for Cell Biology
British Society for Developmental Biology
British Society for Gene and Cell Therapy
British Society for Immunology
British Society for Matrix Biology
British Society for Medical Mycology
British Society for Nanomedicine
British Society for Neuroendocrinology
British Society for Parasitology
British Society of Plant Breeders
British Society for Plant Pathology
British Society for Proteome Research
British Society for Research on Ageing
British Society of Animal Science
British Society of Soil Science
British Society of Toxicological Pathology
British Toxicology Society
Daphne Jackson Trust
Drug Metabolism Discussion Group
Fisheries Society of the British Isles
Fondazione Guido Bernardini
GARNet
Gatsby Plant Science Education Programme (incl. Science and Plants for Schools)
Genetics Society
Heads of University Centres of Biomedical Science
Institute of Animal Technology
Laboratory Animal Science Association
Linnean Society of London

Marine Biological Association
Microbiology Society
MONOGRAM – Cereal and Grasses Research Community
Network of Researchers on Horizontal Gene Transfer & Last
Universal Cellular Ancestor
Nutrition Society
Quekett Microscopical Club
Royal Microscopical Society
SCI Horticulture Group
Society for Applied Microbiology
Society for Experimental Biology
Society for Reproduction and Fertility
Society for the Study of Human Biology
Systematics Association
The Field Studies Council
The Physiological Society
The Rosaceae Network
Tropical Agriculture Association
UK Environmental Mutagen Society
UK-BRC – Brassica Research Community
University Bioscience Managers' Association
Zoological Society of London

Supporting Organisational Members

Affinity Water
Association of the British Pharmaceutical Industry (ABPI)
AstraZeneca
BioIndustry Association
Biotechnology and Biological Sciences Research Council (BBSRC)
British Science Association
CamBioScience
Envigo
Ethical Medicines Industry Group
Fera
Institute of Physics
Ipsen
Medical Research Council (MRC)
Pfizer UK
Porton Biopharma
Royal Society for Public Health
Syngenta
Understanding Animal Research
Wellcome Trust
Wessex Water
Wiley Blackwell