

UCL submission to Adrian Smith Review call for evidence:
Future frameworks for international collaboration on research and innovation

Summary

1. The success of UK research and innovation depends on our continued ability to **attract global talent** and both **lead and participate in international collaborations**.
2. Post-Brexit, the best outcome for the UK would be to become an associated country to Horizon Europe. If that is not possible, a new UK funding scheme should seek to emulate Horizon 2020, with **excellence as the key funding criterion**.
3. Funding should support the entire R&D landscape, including substantial support for **curiosity-driven research** (including for the humanities and social sciences), the **breadth of innovation funding** uniquely provided by Horizon 2020, and opportunities throughout research careers.

Attracting global talent

4. An **enabling immigration system** will be fundamental to the success of a UK international funding scheme. Grants should be linked to **automatic eligibility for visas** or a fast-track application.
5. Outstanding researchers should be eligible to participate regardless of nationality or location.
6. A new UK scheme should include significant **PhD funding**, a **programme analogous to the Marie Skłodowska-Curie Actions grants**, which support mobility, and **international fellowships**.

Attracting R&D investment

7. **Significant public investment** will be needed to **leverage the private funding** required to meet the 2.4% target.
8. **Opportunities for co-investment of public and private funding** and fellowships supporting **innovation leadership** would be valuable.

Processes and policies

9. **Significant lead time** between funding call launches and deadlines will be essential for the strongest international, interdisciplinary and cross-sector consortia to co-create proposals.
10. Where possible there should be a **two-tiered process**, with a proposal outline and pre-selection followed by a full application for pre-selected projects.
11. Support should be provided for project management and due diligence.

Peer review

12. **Rigorous international peer review**, with highly respected international peer reviewers, will be essential to give the funding scheme credibility and, in time, a level of prestige.
13. We strongly recommend the use of **interdisciplinary panels** to assess interdisciplinary research bids.

Introduction

1. As London's Global University, UCL is home to individuals from all over the world (only 60% of our 13,716 staff are UK nationals) and engages with a range of partners internationally – 460 organisations in 79 countries through our global engagement funding alone. We welcome the opportunity to feed into this review led by Sir Adrian Smith.
2. The success of research and innovation at UCL and in the UK depends on our continued ability to attract global talent, and both lead and participate in international collaborations.
3. Post-Brexit, the best outcome for the UK would be to become an associated country to Horizon Europe, given the EU Framework Programmes' uniqueness in providing access to internationally benchmarked prestigious grants and frameworks for multilateral research and innovation partnerships. The UK is the second most successful country under Horizon 2020, having received €5.6bn in funding and taken part in 12,000 research and innovation projects.¹ If association to Horizon Europe is not possible, it will be important to devise a domestic replacement scheme.

Areas of Interest

1. Methods by which new funding arrangements can:

A. support research discovery of outstanding quality in all disciplines through international partnerships

Existing funding schemes

4. While we would welcome the introduction of a new scheme to support international collaboration, **international collaboration should also be embedded in all Government research funding schemes**. We would recommend reviewing how the **ESRC international co-investigator policy could be extended to other Research Councils and disciplines**: this policy allows up to 30% of the grant to go to international co-investigators, regardless of their location.

Key features of a new funding scheme

5. A new UK funding scheme should seek to emulate Horizon 2020, with **excellence as the key funding criterion**. We would particularly welcome the creation of **funding schemes equivalent to those offered by the ERC**, which have considerable prestige and impact.
6. The scheme should be designed to support **international, interdisciplinary and cross-sector research and innovation**, via both individual and collaborative projects. Funding for individuals should be distributed across disciplines and career stages, and should support global networking, including via international research networks (particularly for early career researchers).
7. **Significant funding for responsive mode grants** will be crucial to support the most innovative research ideas; this should include scope and flexibility to fund high-risk projects.
8. **Funding calls implying a significant interaction with, and input from, SMEs or larger Third Party industries should strengthen the academic-industrial interface.**

Diplomacy

9. It will be in the UK's strategic interest to **be proactive in seeking and strengthening international partnerships**, in particular to re-build trust and support positive working relationships with European partners. This should include:
 - a. **engaging with other European nations** imminently, assuring them that a UK scheme would only be introduced if we were unable to associate to Horizon Europe
 - b. **consulting future partners internationally** on the design of a UK funding scheme
 - c. in the early stages, **investing a greater proportion of project funds relative to partners**, to show goodwill.

Variety in partnerships

10. There would be value in funding **partnerships at multiple levels**: between individuals, departments, faculties, whole institutions and across sectors. A nuanced approach is needed to adapt to variation among research systems internationally.
11. **International joint research institutes, with two or three joint directors based in different countries** and one host institution, would foster long-term collaborations. This joint leadership model exists in several Max Planck Institutes and could be adapted for international institutes.
12. We would welcome **expansion of the International Investment Initiative** (I3),² including an increase in funding per project.

Supporting research across the disciplines

13. **Significant funding should be allocated to the humanities and social sciences**, which provide different methodologies vital to solving major societal challenges. The UK's noteworthy success in these areas is worth preserving (94 ERC Starting Grants,³ 91 Consolidator Grants,⁴ and 78 Advanced Grants^{5,6} in the last four calls (2015-18), compared to just 49, 24 and 17 for Germany). There should be a **range of metrics appropriate for different disciplines** and their outputs.⁷
14. Substantial funding should support **areas where the UK particularly excels, including AI and biotechnology**, in order to preserve its edge.
15. It will be vital for the UK to **continue participating in**:
 - a. **pan-European rare diseases studies**, because there are insufficient cases in any single country. The higher concentration of clinical cases in the UK should attract industry and funders internationally
 - b. **pan-European and international collaborations in particle physics and astronomy/space**, such as Project Ariel, where UK involvement and leadership could otherwise be lost.

B. attract to the UK researchers of outstanding capability from around the world

Researcher mobility

16. An **enabling immigration system will be a fundamental precondition for the success of a UK international funding scheme**, and UK research more broadly. We recommend that

visas be linked to grants, with grantees and their families receiving automatic eligibility for visas, or at least being fast-tracked through the application process.

17. **Outstanding researchers should be eligible to participate** in a new UK funding scheme, **regardless of nationality or location** (just as in Horizon Europe). There should not be a requirement for co-funding from international co-investigators' countries of residence; as appropriate there could be a cap on the funds these co-investigators receive.
18. The **UK's research performance is particularly dependent on international researchers**. In 2018, only 25% of the UK's 67 ERC Starting Grants went to UK nationals in the UK (by contrast this figure was 50% in Germany).⁸ The majority, 70%, went to non-UK nationals already in the UK, while 5% of grantees moved to the UK with their grant. Researchers coming to the UK tend to be senior and highly productive, and they have the highest citation rates compared to other groups of researchers (e.g. those staying in or leaving the UK).⁹

Early career researchers and students

19. Given that 70% of the 2018 UK ERC Starting Grant recipients were already living in the UK,¹⁰ they likely came to the UK earlier in their career as students or postdocs. This illustrates the **importance of attracting talented early career researchers and students**, to sustain the UK's pipeline of talent.
20. To this end, a new UK scheme should include **significant PhD funding**, and a **programme analogous to the Marie Skłodowska-Curie Actions (MSCA) grants**, which support mobility.
21. We also **recommend reviewing and reducing the restrictions** (including the 10% cap) **on recruiting EU or overseas PhD students for Research Council-funded studentships**, and minimising any such restrictions in a new UK funding scheme. Currently students must be a UK or EU citizen who has been a UK resident for three years, with limited exceptions¹¹ where 10% of places need not fulfil these criteria.
22. We would strongly advocate **continued participation in the Erasmus+ programme**. In addition to the benefits to UK students of studying abroad, enabling non-UK students to study here can increase their appetite to return to the UK for postgraduate study and longer-term academic careers.
23. The UK should also **foster the pipeline of UK talent into universities**, including by considering the impact of regulation and practice in schools. Notably, the pool of university applicants in Modern Foreign Languages has decreased due to a drop in students taking language A-Levels because they are regarded as being more harshly assessed.

Fellowships

24. **International fellowships will be critical** for attracting the most talented researchers to the UK. In addition to the Future Leaders Fellowship programme, it will be important to **maintain existing schemes**, such as the Newton International Fellowships and UKRI fellowships open to applicants internationally. There should also be flexibility to **provide some Future Leaders Fellowships as research contracts** to enable more positions to be offered.

C. attract further R&D investment to the UK, thereby contributing to the Government's 2.4% agenda

Leveraging private investment

25. **Significant public investment, including in basic research**, will be needed to leverage the private funding required to meet the 2.4% target; CaSE have published informative projections¹². The UK's strengths in fundamental research attract substantial business investment and deliver significant returns. For every £1 of public research funding received, Russell Group universities deliver an average return of £9 to the UK economy.¹³
26. **We recommend setting "missions" to drive the development of solutions to societal challenges**, including by crowding in private investment, as described in the recent report of the UCL Commission on Mission-Oriented Innovation and Industrial Strategy¹⁴. (This approach is also the focus of Horizon Europe.¹⁵) Missions – bold targets that are time-limited, measurable and cross-sectoral – create expectations of market growth, stimulating private investment. Many of our current global challenges require cooperation across borders to achieve appropriate scale and catalyse coordinated industrial investment.
27. Funding should seek to **harness and foster geographical clusters of researchers, innovators, companies, hospitals, users** and so on. Such areas reach a critical density that creates an innovation ecosystem that is attractive to foreign investment.
28. It will be important to **invest in the UK's strong legal, ethical and governance frameworks**, which make it a desirable place to innovate. Investment in, for example, ethical and governance issues around emerging fields including big data and AI could be an important catalyst for international collaboration and industrial investment.

Opportunities for private investment

29. **Opportunities for co-investment of public and private funding** (such as the Innovate UK Investment Accelerator programme¹⁶) are appealing to businesses and would attract investment. A funding stream could also enable businesses to commission research they need on a match funding arrangement.
30. There should be **opportunities for flexibility in specifying how innovation funds will be used**, as has been enabled in many EU grant applications.
31. **EU and international businesses should be made eligible to support CASE studentships**¹⁷. UCL has had to turn down collaborations with non-UK companies owing to the UK-only eligibility.
32. Consideration should go into how best to **create conditions to attract and celebrate global and UK philanthropy for research**.

2. The optimum balance of emphasis for any new funding arrangements in each of the following dimensions:

A. European collaboration, Overseas Development Assistance and global collaboration

33. Post-Brexit it will be particularly important and time-critical to **maintain the UK's relationships with European partners and involvement in European collaborations**, including clinical trials and space missions.

34. It may be preferable to consider nations in terms of research power, since they do not sit squarely in one category (European, global or ODA) and, post-Brexit, European collaborations will become global. There is substantial variation in research power among European countries, for example, and the UK may benefit from collaborating with a range.

Official Development Assistance

35. ODA research funding should be maintained, and supported via:
- a. longer lead time between funding call launches and deadlines (see para 54)
 - b. funds to support relationship building and maintenance (see para 57)
 - c. embedding ODA research more in standard mode funding, and expanding the number of researchers working with low and middle income countries (LMICs)
 - d. parallel to ODA research grants, providing supplementary small-scale funding to allow researchers in high income countries to develop links with those in LMICs
 - e. dedicating funds for infrastructure in Development Assistance Committee country institutions and in knowledge transfer between them and the UK, in particular to support reporting.

B. support for: outstanding individuals; blue-skies research; business innovation and research impact; and research facilities and infrastructure

36. The spread of funding across the aforementioned areas should support the entire research and innovation landscape, including substantial support for curiosity-driven research, mission-driven research including the private and third sector, and opportunities throughout research careers.
37. It will be essential to **replace the nature and breadth of the innovation funding provided by EU Framework Programmes**, since this is the only current source of such funding available in the UK. This includes investment in innovation infrastructure, the flexible innovation support provided by the EIC, and patient finance from the EIB. Certain fields and research centres are particularly dependent on this funding, such as the UCL Institute of Education Knowledge Lab, which develops digital technologies to support education.
38. Grants that support multiple areas would be valuable, for example investments in both activity and the associated infrastructure and facilities.

Outstanding individuals

39. In supporting individual researchers, we would welcome emphasis on:
- a. early career leadership development – this often generates novel findings
 - b. supporting the transition from post-doctoral to permanent positions
 - c. funding for sabbaticals, allowing academics to carry out research without other responsibilities
 - d. funding and training to support researchers to generate and measure impact.
40. In addition, building **distributed capacity and expertise in teams** is crucial. It supports individuals to excel, enables the diversity of perspectives leading to breakthrough thinking, and mitigates the risk of losing expertise if an individual leaves.

Business innovation and research impact

41. Business innovation programmes should seek to provide:
 - a. support for academia-industry collaborations
 - b. follow-on funding to support the development of applications from research (the EIB has been a critical provider of patient finance in this way¹⁸)
 - c. proof of concept funding
 - d. support for **entrepreneurship skills**, including taking forward an idea, developing a business case and managing IP. The Eurostars programme, which supports SME-led international innovative projects,¹⁹ is worth emulating
 - e. support for building relationships, including **fellowships focussed on international exchange and innovation leadership**, with opportunities for international mobility and placements in companies.
42. It will be critical to **maintain the UK's robust system of protection for Intellectual Property** and **support the IPO** in its mission to ensure that the UK remains one of the best locations globally to obtain and protect IP²⁰.

Technology development

43. Funding should support **technology development**, including blue-skies research in technology R&D, and support for the innovation ecosystem (including facilities, Catapult centres, standards and regulation) to leverage and adopt technologies.²¹ This includes "**general purpose**" **technologies**, such as AI, without a specific use but of strategic importance.²²

Facilities and infrastructure

44. Partnering with multiple countries is essential to enable investment in significant facilities and infrastructure, such as the Square Kilometre Array and Large Hadron Collider. We would welcome investment in existing (not just new) facilities.
45. It will be crucial for UK researchers to access international resources including Tier 0 high performance computers (such as PRACE^{23,24}) and the European Open Science Cloud, which underpin research across disciplines.
46. Offering access to the UK's world-leading research infrastructure and platforms, such as those supporting data management, high performance computing and clinical trials, will support international collaborations.

C. research and innovation domains (research disciplines, business sectors etc.)

47. It is preferable to focus on tackling problems, rather than supporting specific sectors, to enable bottom-up innovation and foster a supportive innovation system (see para 43).²⁵
48. Interdisciplinary and cross-sectoral collaborative research and innovation should be supported.

3. Methods and timescales for introducing any new funding arrangements for international collaboration, including those that:

- reflect the ambitions of small and large businesses
- foster new systems of international peer review and funding

Policies, processes and infrastructure

49. Desirable policies and processes for a new international scheme include:

- a. a competitive model of full Economic Cost recovery, ensuring that projects are well supported – this will attract international researchers
- b. stable, long-term funding allocations over 10+ years for large international programmes, including those harnessing infrastructure (CERN provides an example of this model's success)
- c. as streamlined an application process as possible, with minimal bureaucracy.

50. A new funding scheme will require **substantial and well-supported IT infrastructure**, emulating Horizon 2020 by providing one portal with all the research calls, where users can register their interests and search for collaborators and their interests.

Project management

51. Owing to the complex nature of international, interdisciplinary and cross-sector collaboration, it will be important to provide **time, funding and broader support** for:

- a. project management (these costs are eligible under Horizon 2020)
- b. governance arrangements
- c. due diligence requirements – these will vary according to the partner country
- d. facilitating the expenditure of research funds abroad.

Timescale for introducing new funding arrangements

52. If the UK is not able to associate to Horizon Europe, we would welcome the introduction of a UK funding scheme **as quickly as is feasible**.

53. If a full scheme cannot be set up in time to avoid a gap in funding after Horizon 2020, we would welcome **early stage or interim funding streams** (such as expansion of I3).

Timescales for funding calls

54. **Significant lead time** between funding call launches and deadlines will be essential for the strongest international, interdisciplinary and cross-sector consortia to be established and to co-create proposals for impactful research. (Horizon 2020 work programmes last two years.)

55. Where possible there should be a **two-tiered process**, with a proposal outline and pre-selection followed by a full application for pre-selected projects.

56. Sufficient timelines are also crucial to support **diversity in research**, since short calls are particularly challenging for those with caring responsibilities.

57. **Substantial resourcing** is also required to **build relationships and maintain these consortia**, especially those involving institutions in LMICs, and should be eligible in grants.

58. Post-award, there should be sufficient time for collaborations to start (longer than the EC's eight-month limit) and funds to be spent.

International peer review

59. **Rigorous international peer review, with highly respected international peer reviewers,** will be essential to give the funding scheme credibility and, in time, a level of prestige. International peer reviewers should be targeted based on their high standing rather than relying on self-nomination.
60. Considerable incentives will be required to attract non-UK peer reviewers. We recommend **recruiting well-respected international peer reviewers from the UK** first, to make participation more appealing to non-UK peer reviewers.
61. **Peer reviewers with expertise across disciplines, sectors and borders** will be needed. This includes non-academic reviewers who understand what real-world impact looks like.
62. **We strongly recommend the use of interdisciplinary panels** (with academics from multiple disciplines) to assess interdisciplinary research bids. GCRF panels are often largely monodisciplinary, biasing funding towards single discipline heavy applications.

Bilateral partnerships and peer review

63. Complementing international peer review, there would be value in establishing bilateral (or trilateral) partnerships whereby one of the funders carries out the peer review for each call. Such an arrangement exists already between, for example, EPSRC and the National Science Foundation.

4. The roles of Government, UKRI, National Academies and other organisations in defining the agenda for European and international collaboration and administering any new funding arrangements for such activities

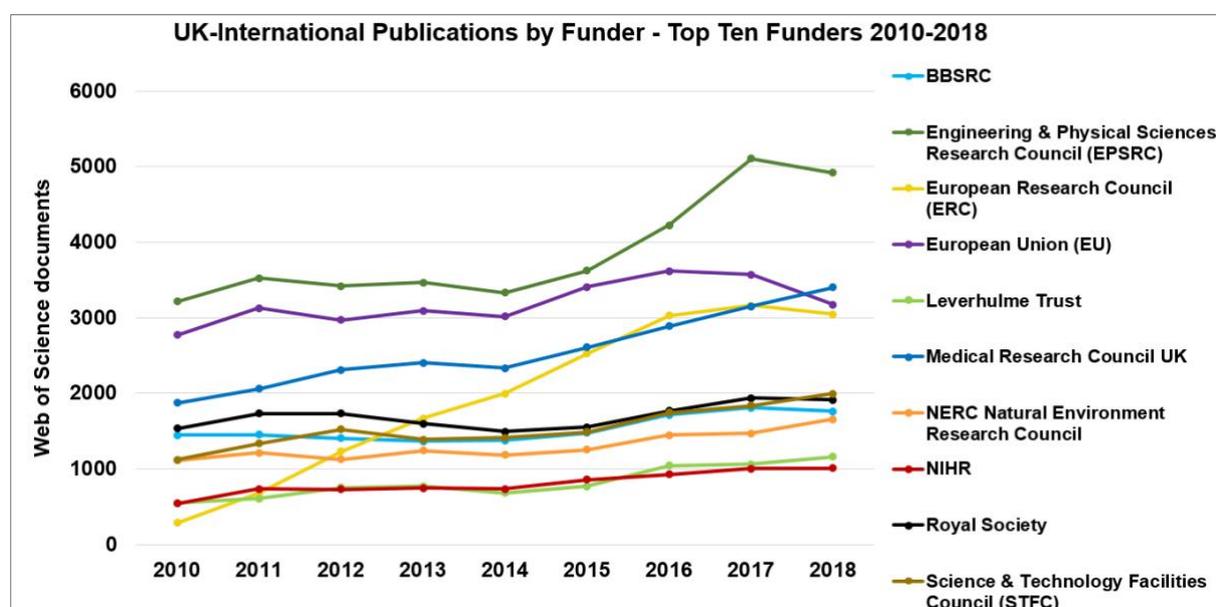
64. To emulate the ERC's prestige and high standards, an equivalent UK funding stream would need to be entirely driven by academic excellence, and therefore would require a high degree of independence from UKRI and Government. The administration could be modelled on the ERC Scientific Council, which makes funding decisions independent of the European Commission. Any streams run by UKRI would be more likely to align to national priorities.
65. However, considerations include:
- a. there are clear risks and challenges associated with setting up an entirely new funder
 - b. the ERC panel structure maintains disciplinary silos; UKRI has managed to overcome these in certain instances (for example the UKRI Future Leaders Fellowships), although not all
 - c. a new funding body would need strong links to UKRI and coordination with existing UKRI international schemes (especially GCRF and the Newton Fund).
66. If UKRI were to administer the ERC-equivalent funding stream, this would require the formation of a new unit within UKRI with a degree of autonomy, and new appointments with international expertise.

67. UKRI's administrative culture is more domestically focused. It does not currently have the structures or processes in place to support research across multiple countries; these would have to be developed.
68. It may be appropriate to devise unique arrangements for different aspects of a new UK funding scheme, given that the elements of EU funding that we would seek to replicate are diverse (ERC, MSCA, more applied research and innovation).
69. In defining research and innovation priorities, it will be essential to:
- preserve the Haldane Principle** and have a balanced, unbiased spread of funding across multiple areas
 - incorporate multilateral, cross-sectoral input**, to enable industrial planning and catalyse the development of a roadmap.

5. Existing evidence on the efficiency and effectiveness of funding for international collaborations

70. According to an independent study, **79% of ERC projects have had major impact**: 19% have led to a breakthrough and 60% to a major scientific advance.²⁶
71. **International collaboration is strongly associated with research impact.**²⁷ In 2014 the field-weighted citation impact of the UK's internationally co-authored articles was 47% higher than that of its nationally co-authored articles.²⁸ There is also significantly more international co-authorship among the top 1% most cited publications, across numerous countries.²⁹
72. Over 2010-2018, there has been an increasing number of publications resulting from the UK's international collaborations (see Fig.1), across multiple funders.
73. Research is a global endeavour, and Fig.1 reflects the increasingly international tendency of UK research. This increase in internationally co-authored publications is particularly notable among ERC-funded UK-international collaborations (see yellow data points), illustrating the value of EU funding for boosting international collaborations.

Fig.1: UK-International publications by funder: top 10 funders 2010-2018



6. Any other issues relating to this work that you wish to bring to our attention

74. Consideration should go into how to minimise the carbon emissions associated with international researcher and innovator mobility, including by supporting research into low carbon transport.

Annex: Introductory questions

1. What is your name?

Professor G David Price

2. What is your email address?

d.price@ucl.ac.uk

3. Are you responding as an individual or on behalf of an organisation?

On behalf of an organisation

4. If responding on behalf of an organisation,

- a. What is your organisation?

UCL (University College London)

- b. What type of organisation are you?

Academic institute e.g. University / Research Institute

5. What region of the UK are you predominantly based in?

London

6. We have obligations under freedom of information laws and there is more information on this below. For the purposes of these laws, would you like your response to be confidential?
(Required)

No

