

# Future frameworks for international collaboration on research and innovation: CaSE submission

This submission focuses on the tangible and intangible benefits the UK has gained from being a member of the EU through the EU Framework Programmes. It also highlights the importance of comprehensively reviewing the effects of the EU Framework Programmes, to gain a deeper understanding of how the UK research base has engaged with, and benefited from, internationally-collaborative programmes.

This submission seeks to cover the areas of interest within the terms of reference for the review under the following headings.

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## The UK's future relationship with EU funding programmes

CaSE's belief is that the UK should seek full participation in Horizon Europe, and this would represent the best outcome for research and innovation in the UK. Association with Horizon Europe is also a stated aim of the Government's International Research and Development Strategy<sup>1</sup>. We do recognise, however, that the current political situation presents an opportunity to not only explore the scope for future UK research funding, but also a chance to evaluate the range of benefits that the UK has received from being part of EU Framework Programmes for Research and Innovation.

First and foremost, if the UK chooses not to fully participate in Horizon Europe, alternative funds must be able to support the strength and breadth of the UK research base where EU research funding has previously. The UK is home to some of the world's top education institutions, some of the most research-intensive not-for-profit organisations and a thriving private enterprise sector that cuts across all scientific and engineering disciplines. Quality and availability of researchers is seen to be the most attractive feature for companies looking to invest in R&D<sup>2</sup>. EU Framework Programmes have played a key role in supporting the UK research base, and being part of the EU has facilitated freedom of movement for researchers and their teams to collaborate internationally. For the Government to reach its target to increase R&D intensity to 2.4% of GDP by 2027, alignment to (or replacement of) European funding will be a crucial piece of the research landscape.

## Alternative funding arrangements to support outstanding research

To best meet the needs of the UK research and innovation community, the first step must be to comprehensively assess the value of the UK's involvement in Horizon 2020 and previous Framework Programmes. This should involve understanding how different organisations interact with Horizon 2020 and the reasons why they engage with the programme: whether this was to fill gaps in the domestic funding landscape, the prestige of European awards, or because application processes are more streamlined.

## Benefits of existing funding arrangements

To date, the UK has secured over €5.5bn of Horizon 2020 funding since the inception of the programme in 2014, making it the second largest recipient of funding<sup>3</sup>. Most Russell Group universities receive between 15-35% of their competitive research funding from Europe<sup>4</sup>. For FP7, Horizon 2020's predecessor, the UK contributed €5.4bn while receiving €8.8bn of funding<sup>5</sup>. In purely financial terms, this is clearly a benefit to UK R&D.

It is not only economic returns that have been beneficial to research in the UK. Analysis by the Royal Society has shown that research that is EU funded and/or has UK and EU authors leads to higher impact and these papers constitute a greater percentage of the most highly cited papers<sup>6</sup>.

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<sup>1</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/801513/International-research-innovation-strategy-single-page.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/801513/International-research-innovation-strategy-single-page.pdf)

<sup>2</sup><http://iri.jrc.ec.europa.eu/survey17.html>

<sup>3</sup>[Horizon 2020 projects and participations statistical database, European Commission](#)

<sup>4</sup>Digital Science, [Examining the implications of Brexit for the UK research base](#), 2016

<sup>5</sup><http://www.sciencecampaign.org.uk/resource/CaSEEPCEURreport2015.html>

<sup>6</sup><https://royalsociety.org/~media/policy/projects/eu-uk-funding/phase-2/EU-role-in-international-research-collaboration-and-researcher-mobility.pdf> (see table 4, page 21).

Our members tell us that the diversity of funding streams, including EU funding, available means they are more able to find funding for their excellence-based work. The diversity of funding that Horizon 2020 provides should not be undervalued, and any alternatives should take this in to account. CaSE produced a report with the Engineering Professors Council that outlined the role of EU membership for science and engineering research<sup>7</sup>. Within the report are a series of case studies that outline how EU funding has been able to support research in the UK, including a specific example of how the diversity of funding streams has maximised impact in photonics research.

#### Intangible benefits of Horizon 2020

Participation in EU Framework Programmes has provided the UK with a number of ‘intangible’ benefits. While not directly measurable, these benefits are wide ranging and help to grow research in the UK. A letter from our chair, Professor Graeme Reid, to the previous Science Minister summarised the outcomes of a workshop co-hosted by CaSE and the Wellcome Trust on the intangible benefits of European Collaboration in September 2018<sup>8</sup>. The following were among the intangible benefits identified by the workshop participants.

- Competition for EU funding raises standards and accelerates research progress.
- EU funding increases the diversity of the UK research base by complementing domestic spending.
- Participation in EU programmes provides access to advanced facilities and access to large data sets unavailable in the UK alone.
- Participation in EU programmes helps attract talented researchers to the UK. The pool of top quality researchers in the EU is clearly larger than that in the UK alone.
- Many research-intensive businesses operate across several EU member states and are attracted to EU research programmes with similar geographic coverage. Business participation in these collaborative programmes may improve access to markets elsewhere in the EU.
- Participants in EU programmes have opportunities to influence the future shape of EU research and innovation and sometimes have opportunities to influence technical standards that shape future regulation.

These benefits are perhaps the most difficult to replicate in the event that the UK attempts to create alternative funding programmes to Horizon Europe. Not least because in continuing to access EU infrastructure and remaining open to an internationally-mobile research workforce will require policies outside of the control of BEIS.

Mobility of researchers – attracting the most outstanding people from around the world  
The future of scientific partnerships hinge on an immigration system that supports the needs of research and innovation in the UK. In the development of potential alternatives to Horizon Europe, immigration policy must support frictionless movement, both for short-term visits and periods of employment and

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<sup>7</sup> <http://www.sciencecampaign.org.uk/resource/CaSEEPCEUReport2015.html>

<sup>8</sup> <http://www.sciencecampaign.org.uk/news-media/press-releases/case-letter-science-minister-intangible-benefits.html>

be aligned with the objectives of any excellence-based international funds created by the UK government.

The opportunity for the UK to take part in, and host, globally-collaborative science has allowed domestic scientists to gain knowledge and enhance their own research. Easy movement of researchers, innovators and specialist technicians gives UK-based businesses a competitive advantage by opening up access to skills and international networks.

Scientific breakthroughs are not developed in isolation – mobility is a key contributor to the highest standards of performance. It is unsurprising that international movement is a feature of academic researchers' careers - 72% of UK-based scientists spent time at non-UK institutions between 1996 and 2015<sup>9</sup>. Scientists in academia and industry are motivated by the desire to work with great researchers in highly respected institutions where the science is of the highest quality<sup>10</sup>. That 28% of academics in the UK are non-UK nationals<sup>11</sup> is a mark of, and contributor to, the UK's research strength. CaSE's members have routinely told us that the strength of the UK's skills base and ease of access to talent are the most important factors in the attractiveness of the UK as a place to do research<sup>12 13</sup>.

#### Erasmus+

The Erasmus+ programme has provided an invaluable opportunity for students and staff to learn, teach or work across Europe. In 2015/16, 15,756 UK-based students spent time in Europe, in addition to 2,625 staff members<sup>14</sup>. The UK also receives a great number of students and staff from abroad, 31,362 students and 4,406 staff members in 2015/16<sup>15</sup>. The scheme also brings economic benefit to the UK, with domestic institutions receiving almost €230m for higher education exchanges between 2014 and early 2018 from Erasmus grants<sup>16</sup>. There is evidence to suggest that student mobility enhances outcomes, students who go abroad are 9% more likely to gain a 1st or 2:1 degree and 24% less likely to be unemployed<sup>17</sup>. Erasmus+ means this opportunity is not restricted to the most privileged. While it is difficult to access data on subjects studied by those on the Erasmus programme it is a reasonable assumption that a sizeable number of Erasmus staff and student participants will be studying or working on STEM subjects. Therefore, the programme is of direct benefit to the science and engineering community in the UK.

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<sup>9</sup> [International Comparative Performance of UK Research Base](#) 2016 Elsevier and BEIS, 2017

<sup>10</sup> DEMOS, Knowledge nomads: why science needs migration, 2009, and Chiara Franzoni, Giuseppe Scellato, and Paula Stephan, Foreign-born scientists: mobility patterns for 16 countries, 2012

<sup>11</sup> [Brexit policy review](#), CaSE, 2018

<sup>12</sup> <http://www.sciencecampaign.org.uk/news-media/case-comment/case-member-hm-treasury-roundtable-r-d-investment.html>

<sup>13</sup> <http://www.sciencecampaign.org.uk/news-media/case-comment/case-roundtable-with-beis-r-d-investment.htm>

<sup>14</sup> [Erasmus+ statistics](#)

<sup>15</sup> [Erasmus+ 2016 in numbers; United Kingdom factsheet](#)

<sup>16</sup> [Innovations to enhance the effectiveness and impact of Erasmus+ successor programme](#), Universities UK, 2018

<sup>17</sup> [Gone International: mobility works](#), Universities UK International, 2017

Optimum balance: maintaining a diversity of funding and focusing on those areas most reliant on EU funding

In developing potential replacements for EU Funding Programmes a full assessment of the impact on disciplines, sectors, universities and regions that have a disproportionate dependence on EU research funding should be undertaken.

Horizon 2020 and previous EU Framework Programmes have made a number of different funding streams available to organisations across the research landscape<sup>18</sup>. This breadth of opportunity is important to enable growth in parts of the research base, whilst also plugging gaps in domestic research funding.

The UK is the country with the highest number of participations and funding received for European Research Council (ERC) grants and Marie Skłodowska Curie Actions (MSCA) in Horizon 2020 (€1.56bn and €830m respectively)<sup>19</sup>. The excellence-based, bottom-up funds from ERC have made up over a quarter of all grant receipts in the UK from Horizon 2020<sup>20</sup>. Finding an alternative to these funds is crucial. Our members in the space and astronomy sector highlight the STFC estimate that between that 30-43% of grant funding for UK astronomy & space science comes from ERC funding alone.

While all parts of the UK are reliant on EU research & development funding to some extent, the areas with the highest dependency overall are South West England, outer London and parts of North England and Scotland<sup>21</sup>.

The National Academies published a report in 2017 entitled 'The role of EU funding in UK research and innovation' that outlined sources of EU funding for research, the role of EU funding across disciplines in UK academia and the role of EU funding in industry. Due to the intertwined nature of UK and EU funding streams in recent years, a situation has developed where some fields of research are more dependent on EU funding than others, both for competitive research funding but also for facilities and networks. Some disciplines such as Archaeology, Chemistry and IT are very reliant on EU funding, while EU grants account for at least 20% of research funding for 15 academic disciplines<sup>22</sup>. The report also has an annex that contains case studies on the role of EU funding across different regions, disciplines and Framework Programme funded partnerships<sup>23</sup>.

CaSE believes it is important that if the UK seeks to create an alternative to participation in Horizon Europe, the funding should not be awarded in an identical way to UKRI grants in order to replicate some of the advantages of diversity of UK and EU funding streams to date. In addition to this, assessment should be made of where current domestic funding streams may overlap with proposals for alternative funding programmes to make sure there is no doubling up of work. Many of our members note that EU funding streams are often the only source for "blue skies" research funding in their discipline, against a

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<sup>18</sup> <https://ec.europa.eu/programmes/horizon2020/find-your-area>

<sup>19</sup> <https://webgate.ec.europa.eu/dashboard/sense/app/93297a69-09fd-4ef5-889f-b83c4e21d33e/sheet/PbZJnb/state/analysis>

<sup>20</sup> Ibid

<sup>21</sup> <http://sciencecampaign.org.uk/CaSEVATbriefing2015.pdf>

<sup>22</sup> [The role of EU funding in UK Research](#), Royal Society, 2017

<sup>23</sup> <https://royalsociety.org/~media/policy/Publications/2017/2017-05-technopolis-role-of-EU-funding-report.PDF>  
<https://royalsociety.org/~media/policy/publications/2017/2017-05-technopolis-group-role-of-eu-funding-case-studies.pdf>

perceived background of an increasingly challenge-led approach of UK funding streams. It is therefore important that any alternative funding streams maintain a diversity of funding across the basic to applied spectrum, from curiosity-led research through to support for commercialisation.

#### Methods for any new funding arrangements

Typically, ERC grants to support excellence-based research are awarded for up to 5 years<sup>24</sup>. Excellence-based UK grants, often called ‘responsive mode’ grants from UK Research Councils, are often awarded for shorter periods of time<sup>25 26</sup>. Grants awarded over a longer period of time can help to provide increased certainty for research teams or PhD students. Any replacement for the loss of EU funding should reflect grant periods currently seen in ERC during Horizon 2020.

Currently, the direction of ERC funding is defined by the independent Scientific Council. The Council is filled by eminent scientists from across Europe<sup>27</sup>, that help to enhance the reputation of ERC grants. The Haldane Principle has shown to be very important to the current UK Government, enshrining the principle in to law in 2017 as part of the Higher Education and Research Act<sup>28</sup>. Should the UK need to find a replacement for ERC funding, whether being partly associated with Horizon Europe or not, it should seek to emulate the valuable aspects of the governance system of ERC to make decisions independently from UK central government.

#### About CaSE

The Campaign for Science and Engineering (CaSE) is the UK’s leading independent advocate for science and engineering. Our mission is to ensure that the UK has the skills, funding and policies to enable science and engineering to thrive. We represent over 115 scientific organisations including businesses, universities, professional bodies, and research charities as well as individual scientists and engineers. Collectively our members employ over 336,000 people in the UK, and our industry and charity members invest around £32.2bn a year globally in R&D.

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<sup>24</sup> [http://ec.europa.eu/research/participants/data/ref/h2020/other/guides\\_for\\_applicants/h2020-guide19-erc-stg-cog\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide19-erc-stg-cog_en.pdf)

<sup>25</sup> <https://mrc.ukri.org/funding/how-we-fund-research/research-grant/>

<sup>26</sup> <https://stfc.ukri.org/research-grants-handbook/4-types-of-stfc-research-funding/>

<sup>27</sup> <https://erc.europa.eu/about-erc/erc-president-and-scientific-council>

<sup>28</sup> <http://www.legislation.gov.uk/ukpga/2017/29/contents/enacted>