

Brexit: EU student exchanges and funding for university research

House of Lords EU Home Affairs Sub-Committee

Submission from the Royal Academy of Engineering

November 2018



About the Royal Academy of Engineering

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.

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Introduction

1. The Royal Academy of Engineering welcomes the opportunity to inform the House of Lords EU Home Affairs Sub-Committee in its inquiry into *Brexit: EU student exchanges and funding for university research*. The Academy is working closely with the engineering profession and the wider research and innovation community to ensure the value of existing partnerships and collaborations are understood. The alliance of the 38 UK professional engineering organisations, known as Engineering the Future, led by the Academy, published the report *Engineering a Future Outside the EU* in October 2016.¹ The Academy is also working closely with its sister national academies, Royal Society, British Academy and Academy of Medical Sciences, to explore how best to support government on issues related to research and innovation.
2. This submission draws from previous Academy's work, including the Academy's submission to the House of Commons Science and Technology Committee inquiries into *Brexit: science and innovation summit*² and *Leaving the EU: implications and opportunities for science and research*³, and the Academy's submission to the Royal Society and Wellcome Trust's *Future Partnership Project*⁴.

UK success in the EU Framework Programmes

3. The UK has world-class universities, an excellent and highly productive research base, an extraordinary history of invention and innovation and many world-leading science and engineering-based companies, to which EU support, both financial and non-financial, has contributed. Engineering is instrumental to delivering the economic and productivity gains associated with investment in research and innovation and provides the means to convert excellent research into new and improved products and services that can and do make a substantial contribution to the UK economy. With engineering contributing at least 20% of the UK's gross value added⁵, accounting for half of the UK's exports, and underpinning much innovation activity, it is essential that the risks and opportunities for UK research, innovation and engineering are fully understood as we leave the EU and make future arrangements.
4. EU research and innovation programmes are unique in the scale and scope of the support they provide for multinational cooperation. For example, Horizon 2020 programmes are the only international research and innovation programmes of their scale anywhere in the world. Other international research and innovation programmes are orders of magnitude smaller and are often thematically based or focused on a narrower geography.⁶
5. The UK has strong track record in securing EU research and innovation funding. In the EU's Seventh Framework Programme (FP7), which ran from 2007 to 2013, the UK came second only to Germany in terms of number of grants held at 14.9% and in total budget share, at 17.2%, equating to €6,940 million.⁷ This success continues in the current programme, Horizon 2020, in which the UK also comes second in both number of grants awarded

¹ [Engineering a future outside the EU](#), Royal Academy of Engineering and EtF, October 2016.

² [Submission to House of Commons Science and Technology Committee Brexit: science and innovation summit](#), Royal Academy of Engineering, February 2018.

³ [Submission to the House of Commons Science and Technology Committee inquiry on 'Leaving the EU: implications and opportunities for science and research'](#), Royal Academy of Engineering, September 2016.

⁴ [Future Partnership Project](#), Royal Academy of Engineering, January 2018.

⁵ [Engineering for a successful nation](#), Royal Academy of Engineering and EPSRC, March 2015.

⁶ [The role of EU funding in UK research and innovation](#), Technopolis, May 2017

⁷ [Seventh FP7 Monitoring Report 2013](#), European Commission, March 2015.

(12.4%) and funding (14.3%, amounting to €4,648 million)⁸. The UK also does exceptionally well from European Research Council (ERC) funding, which funds excellent investigator-driven research, with the UK receiving the highest number of ERC awards and greatest amount of funding (1,052 grants, amounting to 20% of total and £1,483 million)⁹.

6. The UK also has the highest level of participation from Higher Education Institutions (HEIs) in both number of grants awarded (5,699 awards, amounting to 22% of the total) and funding received (£3,070 million, amounting to 24.2% of the total)¹⁰. Four engineering disciplines across UK universities feature among the top ten that received most income from EU government bodies in 2014/15¹¹: IT, systems sciences & computer software engineering (£46 million); Electrical, electronic & computer engineering (£39 million); Mechanical, aero & production engineering, (£34.5 million); General engineering (£28 million).

Business participation

7. While HEIs represent the greatest share of UK participations in EU research and innovation programmes, accounting for 58% of UK participations in Horizon 2020, it is also important to recognise that UK industry, like our academic base, is consistently highly engaged across all industrially relevant areas of the EU research and innovation framework programmes. UK industries currently rank fifth of all EU member states in terms of amount of funding received from Horizon 2020 (with £890 million received up to May 2018)¹², and businesses account for 26% of UK participations in Horizon 2020 at May 2018.¹³ For FP7, the UK was the third most successful country, behind France and Germany, when assessed by both financial contribution to businesses, with UK businesses receiving €1,257 million, and by the number of business participations, at 4544.¹⁴
8. The intersection between academia and business is also particularly important in the context of commercialisation of ideas from academia. EU support for UK high-tech SMEs, including spin outs from universities, is critical and unique when compared to national programmes, and UK SMEs are particularly successful at securing EU research and innovation funding. For FP7, UK SMEs received around £660 million, accounting for around 17% of UK business expenditure on R&D carried out by SMEs.¹⁵ In addition, SMEs received the majority of funding awarded to UK businesses from Horizon 2020, with 65% of total funding granted to UK companies between 2014 and 2016.¹⁶ As SMEs account for only 5% of total business investment in R&D in the UK,¹⁷ EU funding constitutes a much higher proportion of total R&D spend for SMEs than for the business sector as a whole. The UK has been particularly successful with the SME Instrument programme which supports highly innovative SMEs with a clear commercial ambition. UK SMEs rank third in most funding received for Phase 1¹⁸. The programme is perceived as unique by UK participants when compared to national support mechanisms given the terms of the scale of financial support provided and the availability of funding across the development pipeline (feasibility, innovation and business acceleration).
9. Given EU Framework Programmes have a strong focus on collaboration, it is likely that a large share of these participations by business will include collaboration, including with academia.

⁸ [UK Participation in Horizon 2020: May 2018](#), Department for Business, Energy and Industrial Strategy, July 2018.

⁹ Horizon 2020 Hub, European Commission. <https://webgate.ec.europa.eu/dashboard/hub/> Accessed on 16 November 2018.

¹⁰ [UK Participation in Horizon 2020: May 2018](#), Department for Business, Energy and Industrial Strategy, July 2018.

¹¹ [The role of EU funding in UK research and innovation](#), Royal Academy of Engineering, Royal Society, British Academy and Academy of Medical Sciences, May 2017.

¹² [UK Participation in Horizon 2020: May 2018](#), Department for Business, Energy and Industrial Strategy, July 2018.

¹³ [UK Participation in Horizon 2020: May 2018](#), Department for Business, Energy and Industrial Strategy, July 2018.

¹⁴ [Seventh FP7 Monitoring Report 2013](#), European Commission, March 2015.

¹⁵ [The role of EU funding in UK research and innovation](#), Technopolis, May 2017

¹⁶ [The role of EU funding in UK research and innovation](#), Technopolis, May 2017

¹⁷ [Business enterprise research and development, UK: 2016](#), Office for National Statistics, November 2017.

¹⁸ [Representation in the United Kingdom](#), European Commission, April 2018.

10. Strategic business-university research collaborations provide a myriad of benefits to their participants. For academics, these benefits can include the opportunity to address challenging research questions with real-world applications, see their research have tangible impacts and gain access to new skills, data or equipment. Companies can improve business performance through developing new techniques or technologies, de-risk investment in research, and extend the capabilities and expertise available to the firm. Moreover, business engagement in collaborative research also provides access to high quality, research experienced, talent that can have a lasting impact on companies' ability to innovate and enhance competitiveness. Investment in collaborative R&D also delivers real benefits to the UK, driving growth and productivity improvements for firms and high quality research outputs.
11. Underpinning the success of the EU research and innovation programmes is the comprehensive provision of support for international collaboration. There is widespread agreement across the engineering community that international collaboration brings huge benefits to engineering research and innovation in the UK. Collaboration facilitates innovation as new ideas are generated, shared, refined and challenged. Collaboration also gives UK businesses and organisations that specialise in innovation access to a broader range of knowledge, people and facilities than could be obtained in the UK alone. Collaboration is often a requirement of EU research and innovation funding instruments. For example, for Pillar 2, Industrial Leadership, of Horizon 2020, the average number of project partners is just over four, rising to more than 10 for Pillar 3, Societal Challenges.¹⁹ Such programmes have made collaboration with other EU member states relatively easy, much more so in comparison to collaboration with non-EU countries, where a lack of dedicated funding and frameworks hinder engagement.²⁰
12. As a key element of its Industrial Strategy, the UK government has committed to increasing investment in R&D in the UK from the current 1.7% of GDP to 2.4% by 2027, with a longer-term goal of 3%. This is an ambitious target that will require further public investment. But it will also need businesses to do more: that they invest in more R&D, conduct more R&D, and do more with that R&D. Support from the EU is an important part of this target, for both businesses and universities, with the UK currently receiving almost £1 billion a year from EU programmes²¹.

Association to Horizon Europe

13. The future framework programme, Horizon Europe, is currently being developed²², with amendments to the draft proposals due to be voted on. The Academy welcomed the Prime Minister's statement in her Jodrell Bank speech in May 2018 and the continued recognition of the value that the UK derives from EU programme collaborations and the government's ambition to achieve a deep research and innovation partnership with the EU²³.
14. The UK should seek the closest achievable association with future EU research and innovation programmes. A future UK-EU partnership should seek to build on existing strengths, mutual successes, established relationships and shared history. A future partnership should continue to support collaboration and partnership at many different levels, at a range of scales, and across the research and innovation pipeline. The partnership should provide stability and certainty for all partners involved.

Elements that underpin successful partnerships

15. A key element of success of the EU research and innovation programmes is that they enable a diverse range of international research and innovation collaborations at multiple

¹⁹ [The role of EU funding in UK research and innovation](#), *Technopolis*, May 2017.

²⁰ [Submission to House of Lords Science and Technology Committee Leaving the EU: implications and opportunities for science and research inquiry](#), *Royal Academy of Engineering*, September 2016.

²¹ ["No deal" is a bad deal for science](#), *Royal Society*, September 2018.

²² [Horizon Europe: Framework programme for research and innovation 2021–2027](#), *European Parliament*, October 2018.

²³ [Academy welcomes Prime Minister's focus on research and innovation](#), *Royal Academy of Engineering*, press release, May 2018.

levels, for different purposes. From the Marie Skłodowska-Curie Action grants which enable individual researchers to experience training in different countries, starting at the PhD level; right up to large and complex consortia projects. EU research and innovation programmes can facilitate collaborations between multiple businesses, increasing the ease with which businesses can collaborate, scale-up and work towards shared missions, often for societal benefit. One such example is the Clean Sky aeronautical research programme, which was established in 2008 as a Joint Technology Initiative (JTI), and is now receiving support from Horizon 2020.²⁴ It addresses the key societal challenge of developing smart, green and integrated transport. Such initiatives involve very large budget commitments from the EU, as well as other partners, which run into the billions collectively, and dwarf the great majority of national collaborations in the UK or elsewhere.²⁵

16. Stability and certainty are key elements of success for a future partnership. The seven-year funding cycles characterised by the Multiannual Financial Frameworks, such as FP7 and Horizon 2020, provide stable, long-term funding with accompanying long-term strategies. This stability, combined with policy consistency, has enabled UK and EU researchers, institutions and businesses to deliver research and innovation excellence with long-term planning, and can have a positive impact upon leverage as the long-term visibility can give investors confidence.
17. Ensuring that international research and innovation partnerships complement national funding streams is crucial for success. As a member state of the EU, to date, the UK has had the opportunity to shape the EU research and innovation agenda to maximise alignment with the UK's outlook and priorities. Consequently, EU research and innovation programmes have largely provided support for activities beyond those supported by the UK's research and innovation portfolio. For example, an assessment of the motivations for SME engagement in FP7 concluded that 'access to financial assistance not available nationally or regionally' was rated particularly highly as a motivation for UK SMEs, emphasising the fact that SMEs do not have ready access to support of this nature within the UK.²⁶
18. People are integral to the success of research, innovation and collaboration. To date, free movement has allowed UK researchers and innovators to achieve more than they would alone and to build lasting relationships with researchers and innovators across the EU, often through participation in EU research and innovation programmes. The reassurance on EU citizens' rights in the UK²⁷ and the agreement on continued participation for the UK in Horizon 2020²⁸ signals a positive step forward. It will be essential that the UK's future immigration system is designed to allow the realisation of the ambitious and close partnership for research and innovation that the UK is seeking with the EU. This should include ensuring that talented researchers and innovators from non-UK EU countries have certainty, both near-term and long-term, about the opportunities to work in the UK and likewise for UK researchers to work in other EU countries.
19. The whole research and innovation system should continue to be involved in the future partnership. This includes research and technology organisations such as Catapults, and businesses of all sizes, from large corporations to SMEs, innovators and entrepreneurs, as well as researchers and universities. Support should continue to be targeted at collaboration and partnership at many different levels, at a range of scales, and across the research and innovation pipeline.
20. A future partnership with the EU provides an opportunity to evaluate and re-assess priorities of mutual benefit for all partners. With the development of the UK government's

²⁴ [Appendix: Case studies](#), The role of EU funding in UK research and innovation, *Technopolis*, May 2017

²⁵ [The role of EU funding in UK research and innovation](#), *Technopolis*, May 2017.

²⁶ [Performance of SMEs within FP7, An interim Evaluation of FP7 components, Vol 1. Main report](#), *European Commission*, May 2014.

²⁷ [Technical note: citizens' rights, administrative procedures in the UK](#), *HM Government*, November 2017

²⁸ [Joint report from the negotiators of the European Union and the United Kingdom government](#), *HM Government*, December 2017.

Industrial Strategy and the establishment of UK Research and Innovation (UKRI), there is the opportunity to better align priorities and collaborations in areas of strategic importance to the UK, and to ensure efforts continue to complement the UK's research and innovation portfolio.

Domestic alternatives

21. If the UK was unable to secure continued access to EU research and innovation programmes, it would be essential for the UK government to create suitable replacement research and innovation programmes using national funds. Any such replacement programmes should replicate the successful and unique aspects of EU programmes, including support targeted at collaboration and partnership at many different levels, including researchers, universities, large corporates and SMEs, plus long term visibility of themes and subject areas.

Beyond Research and Innovation Framework programmes

22. While the inquiry focuses on funding from the EU's research and innovation framework programmes, the reach of the research and innovation system stretches beyond it.

23. In terms of funding, there are several other mechanisms of support such as: (a) the European Research and Development Fund (ERDF), part of the European Structural and Investment Funds (ESIF), which has played a significant role in enabling regional investments in support of research, innovation and associated activities; (b) the European Investment Fund (EIF) which supported 144 venture capital and private equity funds in the UK and had a total of €2.3 billion in commitments in the UK, leveraging a further €13.8 billion of additional funds²⁹; (c) the European Investment Bank (EIB) has also supported UK research and innovation through the provision of loans, with loan estimates to UK organisations to the value of €5.9 billion in the period 2007-2016, including €2.8 billion for UK universities and knowledge transfer services.³⁰

24. Moreover, the success of existing research and innovation programmes such as Horizon 2020 is impacted by numerous other factors beyond funding and collaboration, for example regulations, access to markets and immigration. It will be essential that a coherent approach is taken as we make arrangements as we prepare to leave the EU.

25. As a key element of its Industrial Strategy, the UK government has committed to increasing investment in R&D in the UK from the current 1.7% of GDP to 2.4% by 2027, with a longer-term goal of 3%. Support from the EU is an important part of this target, for both businesses and universities.

²⁹ [EIF in the United Kingdom Fact Sheet](#), *European Investment Fund*.

³⁰ [The role of EU funding in UK research and innovation](#), *Technopolis*, May 2017