A submission from the British Academy to the House of Lords Select Committee on Science and Technology on the relationship between EU membership and the effectiveness of science, research and innovation in the UK

1. The British Academy, the UK's national academy for the social sciences and humanities, welcomes the opportunity to submit evidence to the House of Lords Select Committee on Science and Technology on the relationship between EU membership and the effectiveness of science, research and innovation in the UK.

2. As the UK national academies stated in their joint submission to the Department for Business, Innovation & Skills' call for evidence on research and development as part of the Coalition Government's Review of the Balance of Competences between the United Kingdom and the European Union, "the European Union has not only provided significant and vital funding to the UK for research and innovation, complementing the UK's funding landscape for research (from public, private and philanthropic sources), but has also created and amplified opportunities for international collaboration and has increased the reputation, competitiveness and attractiveness of the UK as a centre of global excellence in research and innovation. National systems that become isolated from the stream of global knowledge exchange lose their vigour and excellence. Working at a European Union level is a vital element of this and adds value to the UK's own national effort to promote and enrich its research base and research excellence, and to leverage its innovative capacity".[1]

3. This submission demonstrates that the UK is receiving significant funding from European Union research and innovation programmes. Furthermore, it shows that, because research and development investment in the UK is lower than the EU average, EU research funding makes an important contribution to overall UK research and development funding.

4. The UK performs very well in obtaining European research and innovation funding. This can be illustrated in a number of ways. Amongst Member States, in all Framework Programme 7 (FP7 - the EU's research and innovation programme from 2007-13) signed grant agreements the UK ranked second in the number of participations with 17,561, and second in the budget share received by FP7 grant-holders with €6,940 million. The UK was second only to Germany, which had 18,088 participations and received €7,136 million in budget share.[2] In terms of 'higher or secondary education' institutions,[3] the UK has 14 institutions in the top 50 best performers in FP7, which is actually 14 in the top 38, 13 in the top 23, and 5 in the top 10. The 14 institutions the UK has in the top 50 is double any other country, with the next best being the Netherlands with 7. In terms of the top 50

[1] Joint National Academies submission to the Department for Business, Innovation & Skills Call for Evidence on Research and Development in the UK Government's Review of the Balance of Competences between the United Kingdom and the European Union, August 2013: http://www.britac.ac.uk/intl/europe.cfm

[2] European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf

[3] In the European Commission's Seventh Monitoring Report five types of organisation are classified in terms of participation in FP7. These are 'higher or secondary education', private for profit (excluding education)', 'public body (excluding research and education)', 'research organisations', and 'other'. European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf, p.13

best performing regions in FP7, the UK again has more than any other with 8 followed by Germany and Netherlands with 7 each.[4]

5. The UK particularly excels in gaining funding from the European Research Council (ERC) and for Marie Skłodowska-Curie Actions. In FP7 the funding the UK gained via the ERC and Marie Skłodowska-Curie Actions represented an aggregate grant value of 40.3% of the UK's total FP7 grants value overall. This represented the highest two grant value contributions that the UK gained in any FP7 priority area. In addition, 4 out of 10 of the top performing institutions for ERC funding are from the UK, more than any other country.[5] In terms of ERC grants awarded to UK-based academics for the Starting Grants, Consolidator Grants and Advanced Grants across the three domains that ERC awards in (life sciences, physical sciences and engineering, and the social sciences and humanities), UK-based academics lead all other countries in the total number of awards won overall in each of the three grant types and in every domain. In Starting Grants, UK-based academics have won 571 awards over 7 rounds since 2007 out of a possible 2,707. This accounts for 21.1% of all awards granted. German and French-based academics have only won 393 and 365 respectively. If this is broken down by domain UK-based academics have won 19% of awards in the physical sciences and engineering, 17.3% in the life sciences, and more than a third of all social sciences and humanities awards at 33.3%. UK-based academics in the social sciences and humanities have thus won more grants than those in the Netherlands, Germany and France combined, the three countries with the next most Starting Grant awards.[6]

6. In the two Consolidator Grants rounds in 2013 and 2014, UK-based academics have won 21.6% of all awards across the three domains. By domain this is 22% in the physical sciences and engineering, 17.3% in the life sciences and 29.1% in the social sciences and humanities. In the seven rounds of ERC's Advanced Grants since 2008 UK-based academics have won 23.5% of all awards. By domain this is 20.3% in the physical sciences and engineering, 23.4% in the life sciences, almost as an outstanding performance as the Starting Grants with 31.2% of all Advanced Grants awards in the social sciences and humanities.[7]

7. As the UK's national academy for the humanities and the social sciences, the British Academy is understandably pleased with the exceptionally strong track record of UK-based social scientists and humanities scholars in gaining ERC awards at a level even greater than our strong performing UK-based STEM colleagues. This performance of the social sciences and humanities underlines their excellence in the UK's research sector. It also illustrates that these disciplines are truly an area of distinctive UK excellence that is critical to the success of UK research internationally and that UK social science and humanities research is recognised as leading in its field. It indicates that the benefit UK-based academics gain from the ERC as it stands makes an important contribution to the

[4] European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf
[5] European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf
[6] European Research Council website statistics page: https://erc.europa.eu/projects-and-results/statistics accessed on 27 October 2015
[7] European Research Council website statistics page: https://erc.europa.eu/projects-and-results/statistics accessed on 27 October 2015

UK research funding landscape, and particularly for the humanities and the social sciences. It also illustrates that the UK is currently seen as an excellent location in which to conduct research and collaborate internationally.

8. This is a positive picture, and the UK's success from FP7 is paralleled in initial results from Horizon 2020 (the EU's research and innovation programme from 2014-2020).The UK performs particularly strongly in terms of 'higher and secondary education' institutions, but fares far less well in terms of 'research organisations', such as the Max Planck Institutes and the Centre National de la Recherche Scientifique.[8] This is largely because in the UK research often takes place in universities whilst in other countries such as Germany and France there is a stronger tradition of non-teaching research institutes. The strength of the UK's universities classified as 'higher and secondary education' institutions is shown by the fact that they received 70.7% of all the funding the UK gained from FP7 in monetary terms. Only 5 other Member States broke 50% in this category and in Germany the respective figure is only 37.7%. The UK's strong performance in FP7 thus relied heavily on UK universities. That funding from European research and innovation programmes is important to UK universities as well is clearly apparent. This can be further emphasised by the fact that out of the 17,561 participations the UK had under FP7 60.3% were by 'higher and secondary education' institutions, compared to Germany's 33.7%.[9]

9. Funding from the European Union makes a significant contribution to UK research and development, particularly in the context of the UK's below-average gross domestic expenditure on research and development (GERD) compared to the average for EU Member States. This is evidenced in two ways:

    (a) The UK's GERD as a percentage of gross domestic product (GDP) as calculated by the European Commission – that is to say its research and development intensity – is 1.85%, the EU average is 2.02%, whilst Germany's is 2.82% and France's 2.27%.[10] At first glance the difference between 1.85% and 2.82% may not seem that daunting; however, in terms of the raw numbers involved it translates as Germany's GERD being more than double that of the UK. In 2011, Germany's GERD was $80.4 billion compared to the UK's $36.5 billion; and with the UK's flat cash settlement since that year this gap is likely to have widened.[11] This also compares poorly with China and the USA's GERD, which are 5 times ($183.2 billion) and 10 times ($1.14 trillion) more than the UK's.[12] This snapshot is taken whilst the UK's research and development intensity has been declining, compared to other Member States like Germany and

[8] Nick Hillman, *Keeping up with the Germans? A comparison of student funding, internationalisation and research in UK and German universities*, Higher Education Policy Institute, Report 77, September 2015, pp.54-55
[9] European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf
[10] European Commission, Seventh Monitoring Report 2013, March 2015: http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf
[11] International Comparative Performance of the UK Research Base – 2013, A report prepared by Elsevier for the UK's Department of Business, Innovation and Skills (BIS), December 2013, p.15, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf
[12] International Comparative Performance of the UK Research Base – 2013, A report prepared by Elsevier for the UK's Department of Business, Innovation and Skills (BIS), December 2013, p.15, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf,

France as well as to the aggregate EU27 score,[13] underlining the importance of funding from other sources such as from FP7 and Horizon 2020.

(b) Looking at OECD data from 2014 a similar picture is found. The OECD calculates that the UK's GERD as a percentage of GDP from 2014 data is 1.73% compared to an EU average of 1.98%, as well as 2.29% and 2.98% for France and Germany respectively.[14] The OECD also provides data for publicly financed GERD as a percentage of GDP, which for France is 0.82%, Germany 0.86%, the EU average is 0.68%, and the UK is 0.52%, which is also lower than the OECD average of 0.77%.[15] Using 2014 OECD GDP data the total German spend for publicly financed GERD is almost $32 billion, France's is just over $21 billion and the UK's is merely a little over $13 billion.[16] In percentage terms that means the UK spends just under 42% of what Germany spends in publicly financed research and development and just over 63% of France. In this context funding from FP7 and Horizon 2020 can provide significant added value.

10. The UK's reliance on universities for securing funding from European research and innovation funding needs to be put in the context of a below-average GERD and declining research intensity, as well as a shift in Horizon 2020 to more applied research. In early results, this shift to more applied research is seen to favour increased funding to industry over universities compared to FP7. This illustrates a need for continued engagement in the development of the remainder of Horizon 2020 and future programmes so that they are shaped to support the development of UK research as much as possible.

11. The UK's involvement in European research and innovation programmes is of course about more than the funding secured. As the UK national academies made clear in their recent joint submission to the Migration Advisory Committee's Review of Tier 2, the "UK's world-leading position in research was built with global talent" and the UK continues to be a place that attracts the very best research minds.[17] It is important that, like comparable countries, the UK has a range of policies that support and encourage researcher mobility. In that submission the UK national academies encouraged the Migration Advisory Committee to focus on removing unnecessary barriers to the flow of global talent given that "internationally mobile researchers have a significantly higher research performance than sedentary researchers"[18] and that "mobile talent contributes to

[13] International Comparative Performance of the UK Research Base – 2013, A report prepared by Elsevier for the UK's Department of Business, Innovation and Skills (BIS), December 2013, p.16, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf
[14] OECD, *Science and Technology Outlook 2014: Country Profiles – Key Figures*, http://stats.oecd.org/ *(accessed 10 November 2015)*
[15] OECD, *Science and Technology Outlook 2014: Country Profiles – Key Figures*, http://stats.oecd.org/ *(accessed 10 November 2015)*
[16] OECD (2015), Gross domestic product (GDP) indicator, https://data.oecd.org/gdp/gross-domestic-product-gdp.htm (accessed on 10 November 2015)
[17] British Academy argues that UK research needs best of migrant workforce, 29 September 2015, http://www.britac.ac.uk/news/news.cfm/newsid/1326
[18] British Academy argues that UK research needs best of migrant workforce, 29 September 2015, http://www.britac.ac.uk/news/news.cfm/newsid/1326; International Comparative Performance of the UK Research Base – 2013, A report prepared by Elsevier for the UK's Department of Business, Innovation and Skills (BIS), December 2013, p.25-29, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf

the creation and diffusion of knowledge, and the international mobility of researchers creates lasting connections between research institutions around the world".[19]

12. In addition, the British Academy has in recent years focused particular attention through its international policy activity in aiming to shape and influence the development and then implementation of Horizon 2020. The British Academy's activity has been engendered by the belief that a distinctive contribution can be delivered in raising awareness of the critical need for the humanities and social sciences in framing, understanding and solving today's societal challenges at a European level and ensuring that this is reflected within the work programmes and calls of Horizon 2020.

13. This raising of awareness is not a straightforward task, and nor is it one which can be achieved with one single effort. It requires time, attention, discussion, networking, working with partners, and various other forms of engagement and advocacy on a consistent basis. The British Academy worked with other European academies in 2010 and 2011 to argue that the planned loss of a pillar or challenge focusing on the social sciences and humanities from FP7 to Horizon 2020 should not take place and that this loss would undermine the mission of Horizon 2020 to tackle society's big challenges. This led to the European Commission at first creating a new sixth societal challenge, as mentioned by the then Commissioner Geoghegan-Quinn in a speech at the British Academy in November 2011,[20] and then finally a sixth and seventh societal challenge that partly allayed some of these concerns.

14. The European Commission has aimed to 'embed' the humanities and social sciences in Horizon 2020. The British Academy has consistently raised concerns about this approach to the European Commission as have other UK and European bodies. The need for the Commission to address these concerns has meant it has had to justify and report on the effectiveness of its approach.[21] This proactive engagement with the Commission is indicative of the UK's ability through a variety of means to help to favourably shape the EU's research and innovation programme in an effective and useful manner. Arguably the most important site of engagement in this respect is the UK's position and vote on Horizon 2020 Programme Committees that determine the content of its calls.

15. Scientific advice in the EU of course varies between Member States. The UK has a model of science advice that is not shared widely by others. It is important to understand this before assessing how scientific advice operates within the European Commission and the Union more widely. There is no one model, and some Member States (such as Germany) are deeply adverse to the model we are used to in the UK (i.e. a single Government Chief Scientific Adviser). In a Union of 28 Member States, the UK therefore needs to play a constructive role in encouraging the development of institutional frameworks for the provision of excellent scientific advice. The UK's ability to set the agenda and to ensure best practice will depend in part upon its willingness to embrace effective models that

[19] British Academy argues that UK research needs best of migrant workforce, 29 September 2015, http://www.britac.ac.uk/news/news.cfm/newsid/1326;
[20] EU Commissioner announces central role for social sciences and humanities, 10 November 2011, http://www.britac.ac.uk/news/news.cfm/newsid/616
[21] Most recently through a report on the 'Integration of Social Sciences and Humanities in Horizon 2020: Participants, Budget and Disciplines', October 2015, http://ec.europa.eu/programmes/horizon2020/en/news/integration-social-sciences-and-humanities-horizon-2020-participants-budget-and-disciplines

may not exactly replicate what we currently have in the UK. One of the aspects that it is important for the UK to stress is the need to understand the term 'scientific' in a broad sense, to encompass expertise from the humanities and social sciences.

16. The current Commission led by President Jean-Claude Juncker chose not to renew the position of Chief Scientific Adviser to the President of the European Commission, which had been held by Professor Anne Glover FRSE under President Barroso. Partly due to the negative reaction provoked by this poorly communicated announcement, Member States and other stakeholders, particularly from the UK, were able to stress to the Commission the importance of putting in place a robust system of scientific advice. This opportunity to engage with the Commission led President Juncker and Commissioner Carlos Moedas to announce the establishment of a new scientific advice mechanism. This is still to be developed and implemented in full; however, it provides a good opportunity for the UK government and the scientific community to engage with the European Commission in the process of designing an excellent framework for the provision of scientific advice.[22]

17. Nevertheless, the quality and effectiveness of scientific advice within the European Union relies upon the quality and effectiveness of the debate on scientific advice within Member States, as our sister academy, the Royal Society of Edinburgh, has been illustrating recently.[23] The importance of evidence-based policy and listening to and acting upon scientific advice where appropriate is critical to the development of effective public policy in both the EU and its individual Member States. The UK Government, with its established structures, is well placed to engage strongly with other Member States to lead discussions about how this objective can be best achieved. It is important to stress that policy-making also requires public engagement, social understanding, and cultural and historical awareness, necessitating the involvement of experts from the humanities and social sciences. This is particularly important when the scientific evidence presented is characterised by a high level of uncertainty or when ethical or distributive concerns shape public reactions to the evaluation of management of risk.

[22] Five European academy federations are likely to form one part of the scientific advice mechanism. The British Academy is a member of the All European Academies (ALLEA), one of the five. In addition on 10 November 2015 it was announced that Professor Dame Julia Slingo DBE OBE FRS, a Fellow of the Royal Society, would become one of the seven eminent scientists in the High Level Group, another part of the scientific advice mechanism.

[23] The Royal Society of Edinburgh, *The Opportunities from GM and Biotechnology for Scotland*, Advice Paper 15-20, September 2015, https://www.royalsoced.org.uk/cms/files/advice-papers/2015/AP15_20.pdf