A submission from the British Academy
to the House of Commons Select Committee on Science & Technology inquiry on
Leaving the EU: implications and opportunities for science and research

The British Academy, the UK's national academy for the social sciences and humanities, welcomes the opportunity to submit evidence to the Commons Select Committee on Science & Technology on Leaving the EU: implications and opportunities for science and research.

Summary

- The result of the referendum on the UK's membership of the EU represents a challenge to the UK's world-leading research excellence and environment. Scholarship, research and innovation flourish in long-term stable and interconnected frameworks that support people, collaboration, resources and regulation. EU membership provides such frameworks. A bold and concrete public undertaking of short- and long-term commitment to the centrality and value of research and innovation, including the humanities and social sciences, by the Government is required to maintain and enhance the UK's world-leading position at this uncertain time.

- The UK also faces a challenge now in terms of growth, since we have to manage disruption and change, redefine our role in the world and look again at our comparative advantages and key relationships. The growth story is more important than ever. Research and innovation lie at the heart of the growth opportunities in the UK. In an advanced economy, such as the UK, they are key drivers of growth. Universities, research institutions and researchers based in the UK are special sources of comparative advantage. UK research expenditure is more productive than anywhere else in the world but it is much lower than our main competitors as a fraction of GDP. Investment in scholarship, research and innovation will have very high returns and can underpin a revival of growth in productivity. We must also remember the potential contribution of the social sciences and humanities in an economy that is more than three-quarters services-oriented. Now more than ever we must rekindle growth: investing in research is arguably the most powerful intervention to do so.

- The referendum result thus offers an opportunity: an opportunity for the UK to place scholarship, research and innovation at the heart of its international relationships, and its strategy for economic growth, as well as its cultural and social well-being. The UK underinvests in research compared to similar nations; with the challenges now faced by the research community, the opportunity is there for the Government to set out boldly a direction of heightened investment in research that could (at the least) aim to bring the UK up to the OECD average. This could ensure that we maintain and aim to enhance our successful and high impact relationships with EU Member States through existing or new instruments, as well as develop additional mechanisms globally and with our European partners to support our excellent research base.

- UK-based researchers have been remarkably successful in EU research competitions. The level of resources available from the EU, and the types of resources, such as the European Research Council and the Marie Skłodowska-Curie Actions, have to be continued, or where necessary replicated, to maintain the UK's research excellence. The Government should

pay particular attention to certain institutions and disciplines that have been especially successful in winning competitive research funding from the EU such as in the social sciences and humanities, as well as to certain areas such as Northern Ireland where support from the EU such as through structural funding has been important in the development of the research and innovation landscape.

- A future arrangement with the characteristics of the EEA combined with opportunities to influence the development of research would be the British Academy's preferred outcome. Whether that is achievable is another matter. The influence the UK has had over the development of the EU's research and innovation programmes has been critical. This level of influence has been helpful to UK-based researchers and institutions, and to our European partners. Continuing this influence should be a very important consideration for the Government.

- UK universities score very highly in international rankings, more so than other EU Member States. This is because UK universities have been able to attract an international talent pool. Our attractiveness to that talent pool of researchers and students is hugely aided by being embedded in the EU. The ability to sustain the presence of talented European scholars and students at UK universities is essential for our continued future excellence. While the negotiations continue the Government should therefore take immediate steps to support UK-based researchers, including providing a right to remain indefinitely to those non-UK EU and EFTA national researchers currently residing in the UK and those accepting employment here until the UK has left the EU of which researchers in the humanities and social sciences are a significant number.

- The Government should also provide assurance to all EU and EEA students (both undergraduate and postgraduate) that they will be charged the current level of fees (same as UK students) for the duration of their studies if they begin their studies before the UK's formal withdrawal from the EU. Such students should also not be expected to incur any visa costs during their planned studies. In particular, it is urgent that assurance is provided as soon as possible for students entering from 2017 onwards, and in the long-term it is critical to consider how to sustain subjects that now depend very heavily on non-UK EU students.

- It may well take some time to settle the UK's future relationship with the EU and non-EU countries. To ensure that the UK is fully equipped to maintain and build its international relationships in the long-term, the Government should promote an enhanced programme of support for language teaching and learning, as well providing UK researchers opportunities to develop the requisite skills, including language skills, to engage in international projects.

- The UK research community should also be central in the Government's plans on future relationships it wishes to develop and we encourage the Government to engage with research and higher education stakeholders concretely and consistently during the negotiations. Expertise in disciplines within the research community, particularly the humanities and social sciences can also be helpful in supporting and advising on the negotiations ahead and the UK research base should be at or close to the negotiating table.

Introduction

Scholarship, research and innovation are central to the UK's economic, social and cultural well-being. Excellence in the humanities and social sciences in the UK is a national asset that informs and enlarges our understanding and policy-making, as well as being critical to the UK's long-term economic growth and to much of the interdisciplinary work impacting on both economic development and social cohesion.[1]

The pivotal role of research, scholarship and innovation for the UK's productivity and growth, as well as its cultural and social well-being has been challenged by the result of the UK's referendum on membership of the EU. Both UK universities and researchers based here now face an uncertain future. They require rapid reassurance from the Government in order to maintain the UK's research excellence. Research, scholarship and innovation require long-term stable frameworks that support people, collaboration, resources and regulation. Membership of the EU provides such a framework. The current uncertainty is unhelpful to the retention of the UK's reputation for research excellence and is troubling for researchers based here. This is not the sort of long-term commitment to the UK's research base or stable environment that will engender confidence in the Government's support for research. UK universities score highly in international rankings not least because they have been able to draw on an international talent pool in which EU programmes have played a crucial part. The loss of this talent pool risks causing great damage to the achievements of UK universities and research communities.

We thus recommend that the Government makes a bold public undertaking to research, scholarship and innovation as soon as possible in the autumn to restore confidence in the UK and abroad in the commitment of the UK to world-leading research and the UK as a welcoming and supportive destination for international researchers and students, and particularly those from non-UK EU and European Free Trade Association states.

In the following we make some initial recommendations on what such a bold public undertaking might look like. Most importantly, the framework of people, collaboration, resources and regulation are all interconnected. It is not a matter of prioritising one over another or saying which is more important than the other in any future negotiation. As Professor Sir Ian Diamond FBA FRSE, Principal and Vice-Chancellor of the University of Aberdeen, said before the Select Committee on 5 July 2016, there can be no prioritisation as these issues all overlap. If you have resources but not people, if you have collaboration but not harmonised regulation, UK research and innovation will not work as well as it does now for the arts, industry and academia.[2]

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[1] 'Research and Innovation After the EU Referendum', 19 July 2016, http://www.britac.ac.uk/news/national-academies-publish-joint-statement-research-and-innovation-after-eu-referendum; 'Building a Stronger Future', 10 February 2015, http://www.britac.ac.uk/publications/building-stronger-future; LSE Growth Commission, 'Investing for Prosperity: Skills, Infrastructure and Innovation', 2013, http://www.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/LSEGC-Report.pdf; British Academy, 'Prospering Wisely: How the humanities and social sciences enrich our lives', February 2014, http://www.britac.ac.uk/prosperingwisely/pub/pdf/prospering-wisely.pdf

[2] House of Commons Science & Technology Select Committee, 'Oral Evidence: Leaving the EU: implications and opportunities for science and research', 5 July 2016, http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/science-and-technology-committee/leaving-the-eu-implications-and-opportunities-for-science-and-research/oral/34882.html

1. **What the effect of the various models available for the UK's future relationship with the EU will be on UK science and research, in terms of: Collaboration, Free movement of researchers and students; Access to funding; Access to EU-funded research facilities, both in the UK and abroad; Intellectual property and commercialisation of research**

The various models for the UK's future relationship with the EU, as matters stand currently, revolve around two distinct options: (1) that the UK becomes an associated country (i.e. members of the European Free Trade Association (EFTA) and/or European Economic Area (EEA), EU enlargement countries and countries covered by the EU's Neighbourhood Policy), or (2) a third country. Switzerland, due to the result of its referendum on the freedom of movement, currently has a temporary status as a partially associated country, a situation that will have to be resolved by early 2017.

Associate countries that are EEA EFTA states are required to allow for the free movement of people and must provide a mutually agreed financial contribution to the EU budget. For those in the EEA, the EEA Agreement with EU Member States guarantees access to the EU's internal market and its four freedoms: free movement of goods, persons, services and capital. Through this Agreement the EEA states have negotiated access to certain programmes and agencies, such as the current EU research and innovation programme Horizon 2020, the Erasmus+ programme, and the Creative Europe programme.[3] One of the agencies that EEA states participate in is the European Medicines Agency currently based in London.

An EEA-style arrangement - of a kind that currently exists – would for example:
- Provide the UK with opportunities to collaborate through Horizon 2020 and similar, research, innovation and cultural programmes if the UK so chose to negotiate with the EU to participate in them;
- Ensure the free movement of researchers and students;
- Provide access to funding with the UK providing a significant contribution to the research and innovation budget; and,
- Provide access to EU-funded research facilities.

Such an EEA style arrangement would not for example:

- Provide any influence over the development of programmes such as Horizon 2020 before they came into existence. The UK would thus not be able to have any influence over the strategic direction or content of Horizon 2020 as it was being established. This could mean, for example, that Horizon 2020's societal challenges could have been developed in areas that the UK did not have particular expertise in or wished to build expertise in. In addition, bodies such as the European Research Council might not have come into existence without very strong UK support. Going forward, the excellence principle that the UK has long supported in EU research and innovation programmes would lose one of its strongest supporters.
- Enable the UK to have much time to prepare for the entry into force of programmes such as Horizon 2020. For example, the Norwegian Government formally announced that it wished to participate in Horizon 2020 in late May 2013 (the programme launched on 11 December 2013). It was not until a year later that Norway actually was formally associated

[3] Only Norway and Iceland have chosen to associate to Horizon 2020 and Creative Europe from the EEA countries. Lichtenstein has decided not to. All three participate in Erasmus+.

with Horizon 2020: five months after Horizon 2020 had been launched and its first calls had been opened.

A third country arrangement – of a kind that currently exists – would for example:

- Mean that the UK would only be able to negotiate specific opportunities to collaborate through Horizon 2020 or other bilateral arrangements;
- Mean that the UK would have no influence at any stage in the development or implementation of Horizon 2020 and similar programmes;
- Mean that the UK would have to provide its own funding to resource any collaboration;
- Mean that UK-based researchers who wished to access European Research Council funding would have to move to an EU Member State or an Associated Country;

Such a third country arrangement would not, for example:

- Allow for freedom of movement of researchers with new immigration and visa barriers, costs and bureaucracy being placed on students, researchers, staff and universities;
- Allow for access for UK-based researchers to resources and collaboration through Horizon 2020, including the European Research Council and Marie Skłodowska-Curie Actions, or the Erasmus+ programme.

Having said this, the Prime Minister has suggested that she wishes to negotiate a specific agreement for the UK that will not be related to the current options available. At this stage all that can be said is that this is another unknown and a further uncertainty for the community and for our partners.

2. What the science and research priorities for the UK Government should be in negotiating a new relationship with the EU

A future arrangement with the characteristics of the EEA, combined with opportunities to influence the development of research, would be the British Academy's preferred outcome. Whether that is achievable is another matter. The Government should, however, be particularly mindful of the interconnected nature of the research and innovation framework around people, collaboration, resources and regulation.

The wider negotiated framework the Government negotiates will be understandably paramount in determining the impact for UK-based researchers, and the difference between an associated country status and a third country status will be considerable in this respect. Nonetheless, in order to suggest some initial priorities, the British Academy would recommend the following:

<u>People</u>

- Non-UK EU and EFTA national researchers currently residing in the UK and those accepting employment here until the UK has left the EU should be provided a permanent right to remain without waiting for the usual five-year qualifying period. This will end any uncertainty that currently exists about the UK's commitment to researchers based here and those who are considering coming to work in the UK;

- Following the UK leaving the EU, the Government should not create any additional bureaucracy, paperwork, time lost or cost above the current framework for the retention and employment of non-UK EU and EFTA national researchers and the application and attendance of students either already based in the UK or coming here from elsewhere;
- Alongside continuing the mobility of non-UK EU and EFTA students to the UK the Government should take steps to provide, if necessary, routes for such students to remain in the UK following their degrees in order to find employment, such as the current Tier 4 Doctorate Extension Scheme;
- The UK should either fully participate in mobility programmes such as Marie Skłodowska-Curie Actions and Erasmus+ or provide alternative arrangements that provide the same opportunities for researchers, particularly early career, and students to travel, study and work elsewhere in Europe. From a practical and financial standpoint, it would make most sense to remain part of these programmes rather than have to set up new programmes that would inevitably model these successful programmes and would most likely require more UK resource to be equally effective. If this was not possible, then with the national academies' track record in mobility programmes internationally, a similar programme for researcher mobility could fit well within their research funding portfolio;
- The Government should provide a commitment early in the autumn that it will guarantee or underwrite current tuition fee levels for all non-UK EU and EEA students who enrol at UK universities for the duration of their degree until the UK formally leaves the EU. This guarantee would include underwriting current tuition fee levels, if necessary, for non-UK EU and EEA students who begin their degrees while the UK is an EU Member State but finish after the UK has left the EU;
- Research commissioned by the British Academy has shown that half of UK SMEs agree that graduates who speak only English are at a disadvantage in the jobs market, while 70% agree that future executives will require foreign language skills and international experience. In addition, further evidence gathered by the British Academy has found that employers, even those who do not explicitly value language skills, are seeking employees with an international outlook, a global mind-set and cultural intelligence.[4] As the UK leaves the EU, the Government should promote an enhanced programme of support for language teaching and learning in the UK so that we are fully equipped to maintain and build our international relationships.

Collaboration

- The Treasury's announcement that it will underwrite the payment of funds won from the EU on a competitive basis even when specific projects continue beyond the UK's departure from the EU, such as through Horizon 2020, is welcome.[5] We encourage the Government to actively and consistently communicate this guarantee to the European Commission, to other EU Member States and to the UK's research partners elsewhere in Europe, and to work with the research community in the UK in doing so. We would also welcome clarification on how this guarantee will work in practice, as well as the formal financial and legal basis on which it stands. This will be essential clarification for UK

[4] Born Global: A British Academy Project on Languages and Employability, March 2016, http://www.britac.ac.uk/born-global
[5] Her Majesty's Treasury, 'Chancellor Philip Hammond guarantees EU funding beyond date UK leaves the EU', 13 August 2016, https://www.gov.uk/government/news/chancellor-philip-hammond-guarantees-eu-funding-beyond-date-uk-leaves-the-eu; 'British Academy welcomes government guarantees on EU funding', 15 August 2016, http://www.britac.ac.uk/news/british-academy-welcomes-government-guarantees-eu-grant-funding

universities and researchers, and equally important for our partners elsewhere in Europe when applying with us for projects in Horizon 2020;

- Building on the Treasury's announcement, the Government in consultation with higher education and research stakeholders has to consider how to maintain the UK's attractiveness to research partners elsewhere in Europe beyond the life of this guarantee. Many will apply to Horizon 2020 in order to build long-term collaborations of which an application now will be one part. Ensuring the UK is involved in collaborations with our partners elsewhere in Europe is critical to the UK's future research excellence and a vision of to how to achieve this is necessary soon so that the UK's attractiveness as a partner is not substantially reduced;
- The Government should either enable continued collaboration through EU research and innovation programmes after the UK has left the EU or ensure that the same level of collaboration intensity is apparent in UK research performance in the years ahead. For example, currently 60% of the UK's internationally co-authored research papers are with EU partners; such international collaborations lead to research with greater impact. The Government should use this 60% figure as a benchmark and ensure opportunities are available in the years ahead so that UK research does not fall below it;
- As 90% of the world's research is undertaken outside the UK, it is critical that UK researchers should be able to collaborate with the very best researchers overseas. Language skills act as a vehicle to access knowledge and sources in other languages and a lack of such skills will limit the engagement of English speakers in international projects.[6] The Government should consider how to ensure UK researchers are equipped with the requisite skills to engage in international projects, including language skills.

Resources

- Under Framework Programme 7, the UK received €7,009 million between 2007-13.[7] With the increased level of funding available under Horizon 2020 this would have been expected to rise for the period of 2014-2020. The Government should commit that this level of resource will be available whatever the form of the UK's future relationship with the EU;
- Within this commitment the Government should be aware and acknowledge that certain institutions, disciplines and regions do particularly well in terms of winning EU research funding and in attracting non-UK EU and EEA students to enrol for their degrees. This pattern should not act as a penalty now but be seen as the research excellence it is. For example, UK-based researchers have won a third of all Advanced Grants and Starting Grants from the European Research Council, well above the UK average of a fifth for such grants across all disciplines. Special consideration and action has to be taken to ensure the social sciences and humanities are supported as central to the UK's research excellence;
- The Treasury's announcement on funding from the EU provided an assurance that structural funding agreed and signed before the Autumn Statement would be fully funded even after the UK has left the EU. The announcement stated that further detail would be forthcoming, including for projects that would be signed after the Autumn Statement. We would encourage the Government to provide clarification and engage with higher education and research stakeholders as soon as possible in this regard;

[6] Born Global: A British Academy Project on Languages and Employability, March 2016, http://www.britac.ac.uk/born-global
[7] Department for Business, Innovation & Skills, 'UK Participations in Horizon 2020 and Framework Programme 7 as extracted on 23 February 2016', https://www.gov.uk/government/publications/uk-participation-in-horizon-2020-and-framework-programme-7

- Such clarification is vital for academic and business interaction but also in terms of how Horizon 2020 funds and structural funding have been important in areas such as Northern Ireland. For example, universities in Northern Ireland have benefited from structural funding through the INTERREG IVA Programme (a regional structural funding programme for Northern Ireland, the border region of the island of Ireland and western Scotland) and the EU Programme for Peace and Reconciliation in Northern Ireland and the Border Region of Ireland (PEACE Programme). Both of these programmes have facilitated the development (with the assistance of Invest NI) of important domestic research infrastructures, such as science parks and laboratories.[8] The British Academy recommends that the Government pays particularly close attention to the situation in Northern Ireland and works very closely with its Irish counterparts, taking into account sensitively the wider context and history;[9]
- The Government should recognise that EU funding provides certain types of resource that are not currently otherwise available in the UK. Depending on the UK's future relationship with the EU, the Government should give urgent thought to how it can either enable access to or replicate mechanisms and instruments currently provided by the EU, such as the European Research Council, so that the UK can still benefit from these critical forms of resource;
- For example, if the UK were to adopt a third country arrangement, the British Academy would recommend the Government should establish its own body similar to the European Research Council with an international outlook that would require significant funding to attract the very best globally to come to the UK. This frontier research funding for the very best would naturally sit well within the national academies' current research funding portfolio and could be described as a 'Global Frontier Research Programme'.

<u>Regulation</u>

- The common rules and standards of regulation across the EU provide a strong platform for the exchange of people, ideas and data for research such as in data collection and protection, intellectual property, research protocols and other such areas. The Government should undertake a cost-benefit analysis of any movement away from such common rules, which is likely to increase the time lost and cost to UK research, scholarship and innovation;
- Considering the proximity and level of exchange between the UK and the rest of the EU, whatever relationship the UK negotiates with the EU following its withdrawal will still require the UK to apply EU regulations and standards when working with EU partners. The Government should give careful thought, in consultation with higher education and research stakeholders, to how divergent a regulatory relationship the UK wishes to have with the EU, taking into account that the remainder of the EU is a hugely larger market than the UK is.

In addition to these priorities, the Government will have to consider how to provide a nuanced and varied approach to the differing timescales that the upcoming negotiation will entail, and

[8] British Academy and Royal Irish Academy, 'The UK and Ireland: The UK's Referendum on EU Membership – The Implications for Northern Ireland's Higher Education Sector', May 2016, http://www.britac.ac.uk/sites/default/files/British%20Academy%20and%20Royal%20Irish%20Academy%20roundtable%20note%20The%20Implications%20for%20Northern%20Ireland's%20High%20(2).pdf

[9] British Academy and Royal Irish Academy, 'The UK and Ireland: The UK's Referendum on EU Membership – The Implications for UK-Ireland Relations, May 2016, http://www.britac.ac.uk/sites/default/files/British%20Academy%20and%20Royal%20Irish%20Academy%20roundtable%20note%20The%20Implications%20for%20UK%20Ireland%20Relations%20(4).pdf

how the range of agreements it will have to forge will require bespoke consideration for and communication with the research and innovation community. In one recent analysis there are up to six agreements the UK government will have to negotiate in relation to withdrawing from the EU, most of which are relevant to UK research and innovation.[10] These include:

- The UK's legal separation from the EU (the Article 50 process);
- The negotiation of a free trade agreement with the EU;
- The negotiation of interim cover for the UK between its departure from the EU and the coming into force of any free trade agreement;
- Accession to full World Trade Organisation membership;
- New Free Trade Agreements to replace those that currently link the EU and 53 other countries that do not include the USA, China, India, Australia and New Zealand.

The research community in the UK should be central to the planning of each of these negotiations and these new relationships and we encourage the Government to engage with higher education and research stakeholders. This leads to the British Academy's final priority at this stage, that expertise within UK research, particularly the humanities and social sciences, should be represented within the UK's negotiating team and that the Government should open an active dialogue with researchers about how their expertise can support and advise on the coming difficult negotiations in various fields.

3. What science and technology-related legislation, regulations and projects will need to be reviewed in the run up to the UK leaving the EU.

The UK's withdrawal from the EU will necessitate reviewing the current state of play of UK research and innovation, considering the significant shared framework of collaboration, people, resources and regulation in which the UK currently participates. The type of agreement the Government negotiates will depend on the extent to which this shared framework is altered and thus the potential impact on UK research and innovation. An example of this is the UK's leadership and place within EU research infrastructure consortia, such as the European Social Survey. At this stage it is unclear to what extent science and technology-related legislation, regulation and projects will have to be reviewed, but in the case of the UK becoming a third country in relation to the EU any current involvement in Horizon 2020, structural funding, Creative Europe, Erasmus+, scientific advice such as through the new Scientific Advice Mechanism, student fees, and any EU regulation would at the least have to be reviewed with the need to bring into force new instruments or models or where possible, if considered appropriate, adopt EU policies and practices.

This situation illustrates a major issue for UK research and innovation in the coming period and following withdrawal from the EU: lost influence in the shaping, developing and implementing of research policies and practices. Ideally, in any future relationship between the UK and the EU, the UK would retain the ability to influence policies and practices to do with EU research and innovation and those which UK research and innovation could be affected by or provide helpful advice towards. Currently, however, no non-EU Member State has such influence.

[10] Charles Grant, 'Theresa May and Her Six-Pack of Difficult Deals, Centre for European Reform, 28 July 2016, https://www.cer.org.uk/insights/theresa-may-and-her-six-pack-difficult-deals

This problem can be illustrated in two ways. First, at present the Government and the research community can influence the priorities for research funding programmes such as Horizon 2020. A particular example of this has been the focus on excellence and that the overall budget available for research and innovation has been substantially increasing in recent decades. With a seat around the table the UK has been able to push forward these aims. This possibility would now be lost, and it is not clear whether the drive for excellence and more funding available for research and innovation would continue without the UK's strong support.

Second, within the EU the UK is able to influence the development of regulations for example so that they are helpful, rather than damaging, to the UK. This is a constant exercise and at times the process does not work as we would like but within the EU, the UK has been able to influence regulation that is being put forward and to draw attention to regulation that has been brought into force which has then been found to be unhelpful. Outside the EU such influence does not exist and so the UK would have to comply with regulations that would have been designed without its input at the very least when collaborating with EU partners. The new Scientific Advice Mechanism is one hopeful way that the UK could have continued to advance its interests in the development of policies and practices at EU level. This will now become more complicated. The British Academy hopes that through the European academies strand of the Mechanism that the UK national academies will be able to still have some ability to provide advice on the development of EU practices but this is far short of having full influence at the Council table when such practices and regulations are being discussed and agreed.

4. The status of researchers, scientists and students working and studying in the UK when the UK leaves the EU, and what protections should be put in place for them.

Freedom of movement within the EU for researchers offers a significant competitive advantage to the UK research base and, through that, to the UK's economy – and, the Academy believes, to our society and culture as a whole too. UK universities score very highly in international rankings, more so than other EU Member States. This is because UK universities have been able to attract an international talent pool. Our attractiveness to that talent pool of researchers and students is hugely aided by being embedded in the EU. The ability to sustain the presence of talented European scholars and students at UK universities is essential for our continued future excellence. The uncertainty for non-UK EU nationals here and UK researchers overseas has to be resolved quickly. Non-UK EU nationals make up 16% of the UK-based academic workforce[11] and 20% at Russell Group universities.[12] For certain departments, such as economics at LSE, it is far more, with just over 50% of Professors in the department from other EU Member States.

Within the EU and with EU instruments such as the European Research Council (ERC), the UK has been able to attract the best talent. Hélène Rey, named by the Economist in 2016 as 'the one to watch', a Professor of Economics at the London Business School and a Fellow of the British Academy, received one of the first ERC Starting Grants in 2008. Professor Rey came to the UK from the US because she received this ERC award, despite other job offers in the USA.

[11] Royal Society, 'UK research and the European Union: The role of the EU in international research collaboration and researcher mobility', May 2016, p.8, https://royalsociety.org/~/media/policy/projects/eu-uk-funding/phase-2/EU-role-in-international-research-collaboration-and-researcher-mobility.pdf

[12] 'Russell Group universities and the European Union', April 2016, http://russellgroup.ac.uk/media/5417/russell-group-universities-and-the-european-union.pdf

Outside the EU and without an agreement on freedom of movement as a third country, the UK would not have access to the ERC. This is a double problem for UK research and innovation. It would mean (1) that UK-based researchers could not access the premier European frontier research mechanism that is a flagship instrument on which careers can be built, and (2) the UK would have on its door step this very instrument that would be a considerable attraction for UK-based researchers to bid for and if successful leave the UK to somewhere within the EU or an associated country. The lost ability to compete against the very best in the EU would be damaging, but the attraction for the best researchers in the UK to compete would still be there, and it would lead to a major loss of research talent considering how successful UK-based researchers have been in gaining ERC awards.

In terms of total numbers, the humanities and social sciences will be acutely affected by any change to the current framework with the EU which supports freedom of movement. As the British Academy's publication *Prospering Wisely* stated:

"Humanities and social sciences are taught by 65,000 academic staff (more than a third of the total, and around half of all active researchers). One million UK undergraduates study them (46% per cent of the total) together with some 60 per cent of all postgraduates."[13]

Academics and students in the humanities and social sciences thus make a substantial proportion of the UK research and higher education base. Any changes to the current research and higher education framework necessitated through leaving the EU should take into account this constituency.

In addition, it is becoming apparent that there are cases of researchers turning down jobs in the UK or being offered jobs outside the UK following the referendum result. A similar impact is being felt in terms of student applications. Professor John Grattan, acting Vice-Chancellor of the University of Aberystwyth, was reported as saying on 15 July 2016 that over 100 European students had withdrawn their applications to study there after the referendum; 50 of the withdrawn applications took place the day after the referendum.[14] Aberystwyth welcomed 800 students from non-UK EU Member States in 2014-15; thus, a drop of 100 applications is very significant. It will have an impact on university finances, and as importantly it indicates that there is major work to be done to reassure the higher education and research community elsewhere in the EU that the UK is still a place that is welcoming and supportive to their professional and personal ambitions.

Non-UK EU nationals make up 5.5% of the entire student body, but the percentage is far higher in certain universities and on certain courses.[15] The UK higher education and research community relies upon the excellence, talent and goodwill of many colleagues from other EU Member States. This enriches and drives further excellence in the UK research base, and provides a formative experience for our students to study alongside, or abroad, with students of other nationalities and cultures. If the attraction of the UK to students and researchers becomes less and their recruitment becomes more difficult as a consequence that will affect

[13] British Academy, 'Prospering Wisely: How the humanities and social sciences enrich our lives', February 2014, p.2, http://www.britac.ac.uk/prosperingwisely/pub/pdf/prospering-wisely.pdf
[14] '100 cancel Aberystwyth University places after Brexit', 15 July 2016, http://www.bbc.co.uk/news/uk-wales-36799951
[15] UK Council for International Student Affairs, 'International Student Statistics: UK Higher Education', http://institutions.ukcisa.org.uk//Info-for-universities-colleges--schools/Policy-research--statistics/Research--statistics/International-students-in-UK-HE/#International-students-in-UK-HE-by-domicile,-level-and-mode,%3Cbr%3E-European-Union-(EU)-(excluding-UK)-and-non-EU,-2014-15

adversely the UK's ability to compete as a world research leader. It is also likely that there will be disproportionate impact in certain disciplines and departments, which we would encourage the Government to examine this issue in depth.

If the UK came to an agreement with the rest of the EU on EEA status, much of this would be mitigated. The crux of this, however, depends on freedom of movement, which in the current climate appears at best far from certain and frankly unlikely; therefore, to not consider the severe limitations of a scenario that does not include freedom of movement for UK research seems negligent. Such a scenario would fit with what could be interpreted since the referendum result as a colder mood towards non-UK nationals. It is certainly the case that there are other countries that are being encouraged to look at attracting UK-based researchers away from these shores.[16]

In addition, those who have not accrued five years of residency face more uncertainty and insecurity. Many are in short-term postdoctoral research positions, and those near the end of their contracts will be looking at the job market for their next position. This is why, as above, the British Academy recommends that all researchers based in the UK before withdrawal from the EU are provided an indefinite right to remain whether they have been in the UK five years or not.

Depending on the future relationship between the UK and the EU, it is likely that a thorough review of current immigration rules will be necessary. As we have recommended above the Government's guiding principle should be that it does not create any additional bureaucracy, paperwork, time lost or cost above the current framework for the retention and employment of non-UK EU and EFTA national researchers and the application and attendance of students either already based in the UK or coming here from elsewhere. In addition, if necessary the Government should ensure that there are routes for such students to remain in the UK following their degrees in order to find employment, such as the current Tier 4 Doctorate Extension Scheme.

The current situation for non-UK EU nationals and UK institutions is that there is no such bureaucracy or cost. Any increase in paperwork, cost and time will impose barriers to the availability and desire of researchers and students to come to the UK, as well as impose additional burdens on UK universities aiming to attract researchers to work and students to study here.

5. The opportunities that the UK's exit presents for research collaboration and market access with non-EU countries, and how these might compare with existing EU arrangements

International collaborations lead to research with greater impact as measured by citation impact, and 60% of the UK's internationally co-authored research papers are with the EU partners.[17] UK research excellence draws extensively on collaboration with colleagues in other

[16] 'Canadian universities told offer "incentives" to woo UK scholars: Think tank advises universities to take advantage of UK's "instability" after EU referendum', 15 July 2016, https://www.timeshighereducation.com/news/canadian-universities-told-to-offer-incentives-to-woo-uk-scholars

[17] 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.59-69, 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; Digital Science, 'The implications of International Research

EU Member States and the UK requires this to retain its excellence. Given the UK's geographic proximity, historical links and the relative strength of the research base in many countries, UK research excellence draws extensively on collaboration with colleagues in other EU Member States. It is therefore vital that the UK is able to reassure our non-UK EU research partners of the UK's commitment to current and future collaboration.

In the immediate term, there is growing evidence of UK-based partners being asked to leave consortia applications or being downgraded from Principal Investigator status, at the potential loss of significant funding.[18] Evidence is being collected, but there appears to have been an immediate impact in this area. The Treasury's recent announcement on funding from the EU is welcome in this regard, however, further clarification and action will be required as we mentioned above.

This is to say that, as the British Academy's President, Lord Stern, said before the House of Lords Science & Technology Select Committee on 19 July 2016, relationships with EU partners should not be seen as part of some zero sum game with partners elsewhere in the world. The UK should be focusing on strengthening and investing in its relationships with EU and non-EU partners in the fields of research and innovation.[19] This investment across the board in research and innovation with partners in the EU and elsewhere in the world is central to our response to the following question.

6. What other measures the Government should undertake to keep UK science and research on a sound footing, with sufficient funding, after an EU exit

As the British Academy's written evidence to the House of Lords Science & Technology Select Committee prior to the referendum illustrated, the UK currently underinvests in research and innovation compared to our research competitors both in terms of public and private investment.[20] In particular the submission stated:

> "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%.[21] At first glance the difference between 1.85% and 2.82% may not seem that daunting; however, in terms

Collaboration for UK Universities: Research assessment, knowledge capacity and the knowledge economy', February 2016, p.3, https://s3-eu-west-1.amazonaws.com/pfigshare-u-files/4786699/Digital_Research_Report_Collaboration.pdf

[18] Nature News, 'E-mails show how UK physicists were dumped over Brexit', 5 August 2016, http://www.nature.com/news/e-mails-show-how-uk-physicists-were-dumped-over-brexit-1.20380?WT.mc_id=TWT_NatureNews

[19] House of Lords Science & Technology Select Committee, Unrevised Transcript, EU Membership and UK Science Follow-Up, Evidence Session No.1, Professor Alex Halliday, Lord Stern of Brentford and Professor Dame Jocelyn Bell Burnell, Thursday 19 July 2016, http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/science-and-technology-committee-lords/eu-membership-and-uk-science-followup/oral/35325.html

[20] British Academy, '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', November 2015, http://www.britac.ac.uk/sites/default/files/2015-11-19%20British%20Academy%20Submission%20to%20HoL%20ST%20Committee%20Inquiry.pdf

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

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.[22] 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.[23] This snapshot is taken whilst the UK's research and development intensity has been declining, compared to other Member States like Germany and France as well as to the aggregate EU27 score,[24] 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.[25] 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%.[26] 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.[27] 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."[28]

The UK's comparative underinvestment in research and innovation has been offset to some extent in recent years by growing funding available from the EU, which the UK has been very successful in gaining competitively. This funding from the EU is a significant portion of the overall research funding available in the UK. If we take the 0.52% above for what the UK spent on publicly financed GERD as a percentage of GDP in 2014 and the UK's total GDP in 2014 at almost $2.6 trillion[29], then the total spend on publicly financed GERD was £10.2 billion (using exchange rates on 2 August 2016[30]).

[22] 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
[23] 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
[24] 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
[25] OECD, 'Science and Technology Outlook 2014: Country Profiles – Key Figures', http://stats.oecd.org/ (accessed 10 November 2015)
[26] OECD, 'Science and Technology Outlook 2014: Country Profiles – Key Figures', http://stats.oecd.org/ (accessed 10 November 2015)
[27] OECD (2015), Gross domestic product (GDP) indicator, https://data.oecd.org/gdp/gross-domestic-product-gdp.htm (accessed 10 November 2015)
[28] British Academy, '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', November 2015, p.3-4 http://www.britac.ac.uk/sites/default/files/2015-11-19%20British%20Academy%20Submission%20to%20HoL%20ST%20Committee%20Inquiry.pdf
[29] OECD Data, Gross Domestic Product, https://data.oecd.org/gdp/gross-domestic-product-gdp.htm (accessed 2 August 2016)
[30] 1 USD = 0.751320 GBP, 2 August 2016, www.xe.com

Under FP7 the UK received €7,009 million from 2007-13[31], which per annum in average terms works out at €1,001 million.[32] That is £844.13 million per annum.[33] The UK won 15.5% of all funding available under FP7. So far in Horizon 2020 with its larger amount of total funding available from 2014-2020, the UK is winning 15% of all funding available.[34] Horizon 2020 has a total budget of €74,823 billion.[35] The research budget is competitive and won through applications and peer review, so there is no guarantee of funding, but if the UK had kept up its early success rate in Horizon 2020,[36] which is at a similar level to FP7, then 15% of the total budget is €11,224 billion.[37] Per annum over the seven-year period that would work out at €1,603.46 million or £1,353.86 million.[38] Compare that with the FP7 figure per annum and there is something in ballpark terms of a long-run average of £1 billion per annum from EU research and innovation funding that might have been won by the UK. Most likely, this would have been expected to be higher in the years ahead due to the larger amounts of funding available under Horizon 2020, thus this may well be a conservative estimate. Competitive research funding from the EU therefore is something like 10% of total publicly available R&D in the UK. In comparison the UK research councils' budget for 2016-2020 per annum on average is a little over £2.7 billion.[39] This is public investment in R&D, there is also a question here about the readiness or not of the private sector to invest in R&D following the referendum.

There are certain instances and disciplines where the UK has been particularly successful in receiving research funding from the EU.[40] The British Academy would like to illustrate this using two examples. First, universities in general. UK universities are far more successful than their European counterparts in gaining EU research funding. UK universities won 71% of the UK's total funding from FP7. This was the highest percentage of any Member State with only five other Member States breaking 50% in this category.[41] A loss of EU research funding would thus hit UK universities particularly hard.

Second, the humanities and social sciences. From 2017-2015 UK-based researchers in the humanities and social sciences won just over €626 million from Starting, Consolidator and

[31] Department for Business, Innovation & Skills, 'UK Participations in Horizon 2020 and Framework Programme 7 as extracted on 23 February 2016', https://www.gov.uk/government/publications/uk-participation-in-horizon-2020-and-framework-programme-7

[32] The actual figures won per annum will be different due to the profiling of FP7 and the differing success rates year-by-year of the UK.

[33] 1 EUR = 0.843042 GBP, 2 August 2016, www.xe.com

[34] Department for Business, Innovation & Skills, 'UK Participations in Horizon 2020 and Framework Programme 7 as extracted on 23 February 2016', https://www.gov.uk/government/publications/uk-participation-in-horizon-2020-and-framework-programme-7

[35] Official Journal of the European Union, 'Regulation (EU) 2015/1017 of the European Parliament and of the Council of 25 June 2015 on the European Fund for Strategic Investments, the European Investment Advisory Hub and the European Investment Project Portal and amending Regulations (EU) No 1291/2013 and (EU) No 1316/2013 – the European Fund for Strategic Investments', 1 July 2015, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R1017&from=EN

[36] Now very unlikely with the UK leaving the EU and the impact the result has had on confidence in UK research and innovation here and with our EU partners.

[37] To stress that the budget is not decided on a proportionate or *juste retour* basis. This figure is thus indicative only and particularly so as it is projecting forward.

[38] 1 EUR = 0.843042 GBP, 2 August 2016, www.xe.com

[39] Department for Business, Innovation & Skills, 'The Allocation of Science and Research Funding 2016-17 to 2019-20', March 2016, p.6, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505308/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf

[40] Digital Science, 'Examining implications of Brexit for the UK research base: An analysis of the UK's competitive research funding', May 2016, https://s3-eu-west-1.amazonaws.com/pfigshare-u-files/5429912/ExaminingImplicationofBrexitfortheUKResearchBase.pdf; Times Higher Education, 'Which universities would lose out from Brexit', 25 May 2016, https://www.timeshighereducation.com/news/which-universities-would-lose-out-from-brexit

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

Advanced Grants from the ERC.[42] This is just over a third of all total funding that was available in the humanities and social sciences. Divided per annum, this amounts in average to €69.556 million. As a rough comparison, ESRC and AHRC's budget from 2011-16 in average per annum terms was almost £257.5 million.[43] The funding won by UK-based researchers in the humanities and the social sciences from the ERC (just one part of Horizon 2020) was thus equivalent to 23% of the average annual ESRC and AHRC budget combined. The equivalent figures for the life sciences and the physical and engineering sciences (the other two disciplinary categories the ERC uses) in comparison with MRC and BBSRC as the equivalent life science funders in the UK, and NERC and EPSRC as the equivalent physical science and engineering funders comes to around 8.5%.[44] This is a clear sign of UK-based humanities and social science excellence and also indicates that such excellence should be supported now that the UK is leaving the EU.

Funding from the EU is therefore very important, and the Government has to ensure that the same level of funding is available to the UK research base. This, however, is not the only issue at stake. First, as this submission has already stated, the EU provides forms of funding that the UK does not replicate, such as the European Research Council. Either access to such forms of funding has to be maintained or new UK-based instruments have to be created that are resourced competitively. Second, with the UK leaving the EU and the quite possible ending of freedom of movement and therefore full access to programmes such as Horizon 2020 and the framework of people, collaboration, resources and regulation it provides, the UK will be competing globally and at a European level on a playing field where it is in some form outside the main framework for research and innovation in its neighbourhood. In order for UK research excellence to continue to thrive in such a context, the Government has to invest in UK research and innovation at levels that our comparator nations are doing. An initial target could be aiming to raise publicly financed GERD to the OECD average, which currently stands at 0.77% whilst the UK is at 0.52%. This is still well below France and Germany, but it would be a start.

[42] Aggregate data regarding ERC-funded projects provided by the ERC Executive Agency
[43] Department for Business, Innovation & Skills, 'The Allocation of Science and Research Funding 2011-12 to 2014-15', December 2010, p.17, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/422477/bis-10-1356-allocation-of-science-and-research-funding-2011-2015.pdf; Department for Business, Innovation & Skills, 'The Allocation of Science and Research Funding 2016-17 to 2019-20', March 2016, p.6, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505308/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf
[44] Department for Business, Innovation & Skills, 'The Allocation of Science and Research Funding 2011-12 to 2014-15', December 2010, p.17, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/422477/bis-10-1356-allocation-of-science-and-research-funding-2011-2015.pdf; Department for Business, Innovation & Skills, 'The Allocation of Science and Research Funding 2016-17 to 2019-20', March 2016, p.6, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505308/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf