

Brexit: Challenges, Opportunities and Strategy for Scientific Research

Opening Statement and supporting material from Professor Mark WJ Ferguson, Director

General, Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland,

to the Seanad Special Select Committee on the UK's withdrawal from the European Union.

8th June 2017

Introduction

I would like to thank the Chair, Senator Neale Richmond, and the Committee members for inviting Science Foundation Ireland to address the Committee. Science Foundation Ireland is the government's

largest competitive funder of scientific and engineering research in Ireland. The agency supports outstanding research in the areas of science, technology, engineering and mathematics (STEM), which

promote and assist the development and competitiveness of industry, enterprise and employment in

Ireland.

Science Foundation Ireland makes competitive grants/awards based upon merit review for excellence

and impact by international distinguished scientists, and this results in the agency administering research projects of global scale and international excellence, with a high potential to deliver impact for the Irish economy and society. Science Foundation Ireland supported research projects often take

place in partnership with industry, charities and other research funders both national and international – several of those being in the U.K.

We are at a moment of opportunity for research and innovation in Ireland. Yes, there are challenges associated with BREXIT, particularly for our research colleagues in the U.K, but there are also significant opportunities for Ireland. There are actions we can take to mitigate the risks, enhance our relationships and support the Irish research community to exploit the opportunities from an otherwise

uncertain period. We need to act quickly and intelligently: other countries are exploiting these opportunities too.

Since the UK's decision to leave the European Union, I have been taking proactive steps to enhance relationships between research stakeholders in Ireland and in the UK, including key research performing organisations and research funders. In addition, Science Foundation Ireland has developed a strategy which will enable Ireland to capitalise on the research opportunities that arise because of Brexit.

Senior members of Science Foundation Ireland staff participate in relevant government led BREXIT coordination groups and Committees. The agency has also established an internal working group, led by a Director, to ensure agency wide coordination of BREXIT related activities.

I will now set out some of the relevant facts around research in Ireland and the UK and how the system

across both jurisdictions will be impacted by BREXIT and then I will move on to inform the Committee

in more detail on the actions and strategy that Science Foundation Ireland is putting in place.

2 | Page

Scientific research challenges for the UK following Brexit

A summary of the data relating to Brexit and the UK with respect to science was provided recently by Euroscience and the Royal Institution (<http://www.euroscience.org/news/a-discussion-on-brexit/>) for a debate in which I participated at the Royal Institution London on 8th May 2017, and is available in Appendix 1. In addition, the UK's four national academies; The Royal Society, The Academy of Medical Sciences, The British Academy and the Royal Academy of Engineering have indicated four major areas that affect science in the UK following Brexit, namely funding, mobility, collaboration and regulation and have provided detailed independent reports on funding (appendix 2), collaboration and mobility (appendix 3). These provide detailed data and analyses of the effects on the UK, but also provide intelligence on opportunities and challenges for other countries like Ireland. I will first highlight a selection of these UK data to provide the necessary background to understand the challenges and opportunities for Ireland.

The UK is a scientific powerhouse with much excellent research in UK Universities which contributes to their high international status (e.g. University of Oxford is ranked number one in the world). The EU provides funding for research and innovation through three main sources: (1) The EU Framework Programmes for Research and Innovation (currently called Horizon 2020), (2) The European Structural and Investment Funds (ESIF), particularly the European Regional Development Fund (ERDF) and (3) loans from the European Investment bank (EIB). Although the UK is a net contributor to the European

Union, within the focus of research and innovation programmes the UK contributes approx. 12.5% (€5.4b) of the budget and wins approx. 15.9% (£8.8b) back from the programmes. 80% of the UK-won

EU research and innovation funding flows to UK Universities and research organisations, with a relatively low uptake by UK industry (mostly SME's). Five UK Universities (Cambridge, University College London, Oxford, Imperial College London and the University of Edinburgh) are ranked amongst the top ten Universities in the EU in terms of winning the highest amount of EU Horizon 2020 funding.

The top 10 UK Universities win approximately 50% of the total EU research and innovation funding to the UK.

It is unclear whether the UK will negotiate access to any, or all, of the EU scientific programmes post Brexit, and if they do, as a third associated country, what formal or informal restrictions may be placed

upon them (e.g. they may not be able to lead large EU funded projects). If they negotiated access on the same terms as Norway and Switzerland then calculations indicate that the UK would change from

being a net beneficiary to become a net contributor to the programme (21.26%) and whether the UK would choose to pay for these non-monetary benefits as opposed to developing their own schemes, e.g. with the Commonwealth, USA, China etc. is unknown.

Over 90% of UK researchers collaborate with researchers overseas.

Approximately 17% (33,735 individuals) of research staff in UK Universities are non-British, EU-27 citizens and that percentage increases significantly in the research-intensive Universities, e.g. Oxford,

Cambridge, Imperial College London, University College London. 23% of all UK University staff in biological, mathematical and physical sciences are EU-27 citizens. It has been estimated that many of these would not qualify for a UK visa under the current UK regulations.

3 | Page

Internationalisation of higher education is a common and increasing global phenomenon and the UK is at the forefront of this. More than 42,000 UK tertiary level students are studying abroad amongst which more than 35% are in an EU country including 9.9% (2,106 individuals) in Ireland. 14% (12,000) of PhD students currently registered in the UK Universities are EU-27 nationals. The UK is also a very popular destination for both overseas students and visiting overseas students and researchers, e.g. through the EU Erasmus and Marie Skłodowska-Curie programmes. On Erasmus programmes, the UK receives approx. 30,183 students from other EU countries and sends approx. 14,801 students to other

EU countries. The UK dominates the Marie Skłodowska-Curie programme with 2,233 participations – many more than any other EU country (Ireland has 216 participations) - largely due to the UK's scientific excellence and native English language.

Scientific Research Challenges for Ireland following Brexit

In the European scientific research framework programme Horizon 2020, Ireland has set an ambitious

national target to win €1.25b of funding over the lifetime of the programme. This is more than double

Ireland's performance in the previous programme (Framework Programme 7) and would represent approx. €300m more than we contribute: Ireland is currently on track to achieve that ambitious national target. In simple terms, this means we have been, and must continue to, double our performance. It also means that we need to lead and win more projects, particularly larger projects and to ensure that we have the quality and numbers of researchers in both academia and industry and the appropriate national supports to win such funding.

What impact would the loss of the UK as a potential collaborator in EU programmes have on Ireland?

A formal analysis of the EU e-CORDA database indicates that of all the successful Irish projects in Horizon 2020, 11.5% (1,157 links) of them involve the UK as a collaborator. As a percentage, this figure

is both similar to the percentage of Irish collaborations with other major European countries, e.g. Germany at 11.3% (1,139 links) and it is also similar to the profiles of peer EU countries, e.g. Denmark

or Finland. In all cases these collaborations occur in multi partner projects, i.e. they are not exclusive UK-Ireland relationships. Ireland is therefore not overly-dependant on the UK for scientific collaboration in successful EU programmes, as over 88% of successful Irish EU Horizon 2020 collaborations do not involve the UK. Furthermore, analysis of the larger successful EU Horizon 2020 projects involving the UK and Ireland as collaborators shows that the UK leads (co-ordinates) less than

10% of these projects (which in total represent 9.1% of the funding won by Ireland) and that the distribution is evenly spread across scientific disciplines, e.g. energy, ICT, medical etc. It therefore appears that Ireland has no critical dependence on the UK, either in a specific domain of science or for

overall leadership.

Given that the UK will not be exiting the European Union until 2019 and that the UK Government have

already agreed to honour all Horizon 2020 commitments made up to that date, we believe that the current situation is manageable from an Irish perspective by supporting Irish researchers to find alternative partners.

4 | Page

Other potential challenges include;

- loss of a like-minded ally in negotiations on FP9 (pre-eminence of research excellence when awarding funding; protecting the civilian nature of the programme etc.)

- potentially smaller EU Research and Innovation budget due to loss of UK contribution
- impact on Northern Ireland - 54% of the Northern Ireland draw down comes via North-South collaborative projects.

Many groups foresee streamlining of research-related regulations in the UK post Brexit, e.g. in clinical

trials, environment, health and safety, toxicity, genetically manipulated organisms, gene editing, reproductive technologies etc. as a source of future competitive advantage over EU-27 countries.

Opportunities for Ireland in scientific research arising from Brexit

It is clear from the above that Brexit produces new opportunities, as well as challenges, for scientific research in Ireland.

Potential opportunities for Ireland include;

1. Increased success in the European Horizon 2020 research programmes, particularly leadership of large ambitious programmes, which may previously have been led by UK researchers
2. Attraction of outstanding researchers to Ireland
3. Attraction of outstanding international students to Ireland
4. Attraction of international visiting researchers to Ireland, e.g. to capture some of the current UK Marie-Curie applicants
5. Significantly enhanced bilateral research links with the UK
6. Acting as a bridge between the UK and the EU (and the US).

Science Foundation Ireland's Brexit Strategy

With the above considerations in mind, Science Foundation Ireland's Brexit Strategy is as follows:

1. Diversify and strengthen scientific research collaborations with EU-27 countries so as to

maintain and enhance Ireland's research performance under Horizon 2020, irrespective of

the final UK participation, or not, in such EU programmes in the future.

This strategy has commenced. For example, Science Foundation Ireland is deepening its relationship with the German Fraunhofer-Gesellschaft, which is the world's leading applied research organisation. We have recently launched the first jointly funded (Science Foundation Ireland and Fraunhofer-Gesellschaft) Fraunhofer project research centre at Dublin City University. We plan to further strengthen collaborations with Germany and other EU-27 countries through both lead agency and research cooperation agreements and joint funding.

5 | Page

2. Strengthen and enhance bilateral research collaborations with the UK.

Irrespective of the outcome of their final negotiations with the EU, the UK is, and will remain, a scientific powerhouse. The UK is currently developing and significantly enhancing research collaborations with other countries, e.g. Commonwealth, USA, India, China etc., and the UK Government have recently added an additional £2 billion to the UK research budget. It is therefore vitally important that Ireland maintains its strong collaborative research links with the UK and enhancing these is a good strategy, irrespective of the final position of the UK within the European Framework Programme (at the one extreme if the UK are in, then such enhancement will increase the chances of mutual success and at the other extreme, if the UK are out of the EU programmes, Ireland will need these strong bilateral relationships).

To that end, Science Foundation Ireland has strengthened its collaborations with all of the major UK research funders; Engineering and Physical Sciences Research Council (EPSRC), Biotechnology and Biological Sciences Research Council (BBSRC), the Royal Society and the Wellcome Trust. These collaborative arrangements allow joint teams of UK and Irish based researchers to apply to a single UK agency describing their collaborative research proposals. Following international peer review for scientific excellence and impact, if those proposals are deemed fundable (success rate is around 15%) then the UK organisation funds the team and the work conducted in the UK and Science Foundation Ireland automatically funds the team and research conducted in Ireland. These bureaucratically simple, lead agency approaches

are already enhancing research collaborations between Ireland and the UK and are providing researchers in Ireland with access to excellent facilities and people and to experience some of the world's most prestigious competitive scientific funding programmes. A summary of Science Foundation Ireland's bilateral ongoing research agreements involving the UK is given in Appendix 4.

Science Foundation Ireland is currently developing a new initiative, aimed at stimulating the exchange of PhD students between Ireland (from the 16 SFI Research Centres) and a small number of research-intensive UK Universities, e.g. Oxford, Cambridge, Imperial College London, University College London. In summary, every year approximately 30 PhD students would be registered at an Irish University, supervised by a researcher in one of these Science Foundation Ireland Research Centres, but spend approximately half their time researching at the UK institution under the joint supervision of a leading UK researcher. Reciprocally approximately 30 UK PhD students registered at those UK Universities would spend half their time in Ireland researching under the joint supervision of a leading Irish researcher in one of the Science Foundation Ireland Research Centres. We propose an initial pilot scheme is funded for four years' intake (i.e. eight years in total), i.e. 120 PhD students registered in Ireland and approx. 120 registered in the UK – a total of 240 PhD students jointly supervised and moving between the UK and Ireland over the course of the eight year pilot. Science Foundation Ireland is currently in active discussions with the UK Universities and the UK Department of Business Energy and Industrial Strategy and with the appropriate Irish Government departments to secure the additional new budget in the UK and Ireland to initiate this scheme. We strongly believe that enhancing this mobility and collaboration among the best and brightest young researchers will be of both short term and long term benefit to both countries.

6 | Page

3. Recruiting excellent researchers to Ireland

Given the challenges posed by Brexit for scientific research in the UK and the fact that Ireland's standing in research has increased significantly over recent years (Ireland has steadily risen through scientific rankings and is now ranked 10th in the world, up from 20th in the world in 2012 and 48th in the world in 2000 - when Science Foundation Ireland was established) there is a significant opportunity to recruit outstanding researchers from the UK who are uncomfortable about the uncertainty or final outcome of the Brexit negotiations for UK scientific research.

To that end, Science Foundation Ireland operates two international recruitment programmes in partnership with the Higher Education Institutes in Ireland; the Science Foundation Ireland Research Professorship programme and the Science Foundation Ireland Future Research Leaders programme. The Higher Education Institute provides the salary and physical accommodation, whilst Science Foundation Ireland will accept and internationally peer review a competitive research grant application which, if successful, can provide funding of up to €1m a year for five years to cover the direct costs of the research project (e.g. PhD students, postdoctoral researchers, consumables, equipment etc.) of the star researcher. This is an important programme – star researchers matter. They attract collaborative research funding from the world's leading companies, generate intellectual property and spin-out companies, attract companies to build research and development operations in Ireland, attract the best students from Ireland and around the world, attract the best staff from Ireland and around the world, and they significantly enhance Ireland's international reputation.

The Science Foundation Ireland Research Professorship programme focuses on recruiting outstanding star researchers whilst the Future Research Leaders programme focuses on recruiting emerging stars. In both cases, the competitive research grant provided allows the star researcher to commence their research programme in Ireland from the day they arrive. These recruitment-only programmes are open to individuals from anywhere in the world but Brexit provides a significant opportunity to attract outstanding researchers currently located

in the UK, to Ireland. To date, seven Science Foundation Ireland Research Professors and five Future Research Leaders have been appointed and Science Foundation Ireland plans to significantly expand and promote these programmes if it receives the appropriate budget to do so. An appropriate request has been submitted to the Department of Jobs, Enterprise and Innovation.

In addition, Science Foundation Ireland plans to further develop these programmes to include joint appointments, whereby a star researcher would spend a proportion of their time at one of the leading UK Universities, e.g. Oxford, Cambridge, Imperial College London, University College London and a proportion of their time in a Science Foundation Ireland Research Centre, hosted by one of the seven Irish Universities. Science Foundation Ireland would mandate that the researcher would need to spend at least 40% of their time in Ireland (they would need to spend at least 50% to be eligible for EU funding). Salary costs etc. would be shared between the UK and Irish Universities appropriately and following the competitive application process summarised above, Science Foundation Ireland would provide funding for

7 | Page

the research component conducted in Ireland. This is a major opportunity to recruit very high calibre researchers who may not locate in Ireland full time.

4. Attract international students and researchers to Ireland

Given the quality of Irish scientific research and the fact that Ireland will be the only native English speaking country in the EU, there is a significant opportunity for Irish researchers and Universities to attract overseas students and researchers, either full time, or as visitors, who would previously have gone to the UK. To that end, Innovation 2020, the government approved strategy for research and innovation calls out for an expansion of the number of PhD students in Ireland (by 500). Science Foundation Ireland has developed a PhD studentship scheme which will be rolled out as soon as the agency receives sufficient additional budget to do so.

Moreover, the UK is a dominant attractor of EU researchers on the Marie-Sklodowska-Curie programme – a programme where Ireland is already strong and is likely to become increasingly attractive (English speaking, high quality research, good industrial and international linkages). We plan to significantly increase successful applications to the Marie-Sklodowska Curie co-fund programme from 2018-2020 to attract researchers from both EU-27 countries and the UK. This will require increased Irish public funding which will leverage matching EU co-funding.

Innovation 2020: Ireland's Strategy for Research and Development, Science and Technology

Innovation 2020 is the government's approved research and innovation strategy. All the above initiatives are consistent with actions called out in Innovation 2020, such as the expansion and development of the Science Foundation Ireland Research Centres, the development of existing and new research infrastructures to enrich the national product offering, the development of further international research links, the expansion of PhD student numbers, recruitment of Star Researchers etc. Innovation 2020 commits the government to significantly increased expenditure on research and

innovation by both the public and private sectors. The urgency of this increased investment is underscored not only by the Brexit opportunities above but also by the significantly increased performance (excellence, markedly increased industry co-investment, increasing numbers of researchers employed in industry etc.) of the Irish research and innovation system. The recent 2017 EU Country Report for Ireland also emphasises the importance of increased public investment in research and innovation and highlights that Ireland ranks 25th out of 28 EU countries, i.e. third last in terms of public expenditure on R&D as a % of GDP. This is not a good place to be, especially when the

efficiency and performance of the current Irish system indicate that increased investment will produce disproportionately positive outcomes.

The Science Foundation Ireland programmes (Science Foundation Ireland Research Centres and partnerships programmes), together with the EU Horizon 2020 programmes have led to a significant increase in industrial funding of research in Ireland in recent years. This is important for our economic

future. Outstanding researchers (and research) attract innovative companies, generate discoveries

8 | Page

and developments which result in the creation of new companies and the transformation / expansion

of existing companies. Suitably trained researchers are a key talent and asset for our future economic

base. Outstanding research, e.g. in public health or the environment, improves the quality of life for all citizens and leads to better public policy.

On balance, in scientific research, Brexit can provide more opportunities than challenges for Ireland and it is imperative that we quickly seize these before others. To that end, Science Foundation Ireland

has been working with our parent department (Department of Jobs, Enterprise and Innovation) and has submitted a detailed case and budget request to roll out the programmes summarised above.

The

advantages are not limited to academia. It is well known that those companies who invested in R&D have proven to be more resilient in financially challenging times such as those experienced in this country over the last decade. In uncertain times, there is no better place to invest taxpayer's money than in research and innovation.

Professor Mark WJ Ferguson, 1st June 2017

Appendices:

Appendix 1 The Royal Institution London report; 'Brexit: The Facts behind Opportunities and Challenges

for both the UK and European Science Establishments'

Appendix 2 Technopolis Group Report 'The role of EU funding in UK research and innovation',

commissioned by the four UK National Academies

Appendix 3 Report on 'The role of international collaboration and mobility in research' commissioned

by the four UK National Academies

Appendix 4 Summary of Science Foundation Ireland existing UK-Ireland collaborative scientific research schemes