The Foundation for Science and Technology
Debate Record Note

International Research Collaboration Post-Brexit

Date and Location: 26th February 2020 at The Royal Society

Chair: The Rt Hon. the Lord Willetts FRS
Chair, The Foundation for Science and Technology

Speakers: Professor Dr. Dr. h.c. Günter Stock
Chair, Einstein Foundation
Professor Sir Adrian Smith FRS
Director, The Alan Turing Institute
Professor Graeme Reid
Professor of Science and Research Policy, University College London
Professor Dame Nancy Rothwell DBE DL FRS FMedSci FBPhS
President and Vice-Chancellor, The University of Manchester
Rt Hon Chris Skidmore MP
Former Minister of State for Universities, Science, Research and Innovation

Report Author: Marie-Louise Taylor
Foundation Future Leader, and Science Capability Policy Lead, Government Office for Science

Sponsors: Defence and Security Accelerator (DASA)

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LORD WILLETTS opened the conference remarking upon the tremendous interest and attendance at the evening's event as a reflection of both the importance of the issue and the distinction of the speakers assembled. The discussion is timely, with talks beginning in the coming week to agree the future trading relationship including the relationship on science and research. In this context, Lord Willetts welcomed and congratulated The Rt Hon Greg Clark MP, in attendance as the newly elected Chair of the House of Commons Select Committee for Science and Technology.

PROFESSOR DR DR H.C. GÜNTER STOCK, on video-link from Berlin, reflected firstly that while much of the debate concerning the research and development system in Europe has concentrated on how the UK might be disadvantaged following EU Exit, Europeans will also experience losses at the levels of strategy, projects and publications, and people. Prof Stock noted the long-standing importance of a European community of academics and expressed his desire that intellectual activity is maintained.

Referring to a 2019 Nature paper, 'Europe the Rulemaker', Prof Stock agreed with the authors that, given Europe's growing research base and with the Horizon Europe programme currently set to spend approximately €94 million over the course of the programme, Europe has gained a leadership role in governing and in directing even global research. Most notably, European researchers are setting the direction in the areas of climate change, chemical regulation and data protection.

Pascal Lamy made it clear, in a High Level Group review of the Horizon 2020 programme in 2017, that it is up to the EU to continuously invite the rest of the world to collaborate in research and innovation, and there is an opportunity now for EU Framework Programmes to become a nucleus of global programmes.

Prof Stock cautioned on the loss of internationality in the European research base

after EU Exit, and said that the international network possessed by the UK excels that of European research in both quantity and quality, owing partly to the international history of the UK in the commonwealth.

Prof Stock questioned whether European scientists are willing to take comparable risks, especially in the field of life sciences, and praised the pragmatic example set by the UK in the fields of stem cell research, artificial fertility and cloning.

British scientists played a leading role in the coordination of Horizon 2020 programmes; 20 per cent of these were led by British Scientists and only 11 per cent by German scientists. The diminishing number of British applications and grants from Horizon Europe heralds a loss of competence, quality, ideas and innovation for the European community.

Since 1998, the number of highly ranked UK publications that were produced through international co-operation has increased from 26 to 55 per cent. Germany is the UK's most frequent international collaborator in this context; continued partnership between the two countries should be a priority.

Free movement for European scientists is not a new concept, with the 1088 Bologna Declaration asking for free movement setting a precedent. Countermeasures will be needed to maintain European students' access to British universities; in large universities there is already a weakening in European representation amongst staff and students. Europe must maintain brain circulation, or brain traffic, through the Erasmus programme as a minimum. Prof Stock called for politicians to appreciate the necessity of working internationally and in multi-disciplinary consortia to deal with the great challenges facing the world.

Prof Stock spoke in favour of full association membership for the UK, acknowledging that even this will not entirely replace the current system. Additional measures, like bilateral agreements, should be explored to address the gap. Prof Stock laid out his vision for bilateral measures between the UK and Germany, proposing joint graduate schools for students, visiting fellows programmes for researchers and joint colleges for advanced studies, hosted between universities. Additional international research institutes, hosted in European countries and open to research groups worldwide, could work on a shareholder-stakeholder model for European researchers, with membership for International collaborators.

Regardless of the outcome of negotiations, the UK and Germany should continue to collaborate. International research has a unifying power to break down barriers between nations.

PROFESSOR SIR ADRIAN SMITH FRS and **PROFESSOR GRAEME REID** spoke in turn on the findings of their November 2019 report 'Changes and Choices'. The report was commissioned by the incumbent Minster for Science, The Rt Hon Chris Skidmore MP. In the context of the UK seeking to associate to Horizon Europe, the report sought to explore the alternatives in the event the UK chose not to, or were not able to, associate to the programme. The report did not consider whether or not to associate – that question requires separate consideration.

The UK is in new territory; what was, for decades, a designated subscription to EU Horizon programmes as part of the UK's conditions of membership of the EU is now able to be weighed up by HM Treasury against any other domestic expenditure. The contribution to the UK's gross domestic investment in R&D provided by EU programmes is only three per cent. However, this small proportion masks patterns of concentration, notably in Russell Group Universities, some regions of England, the Devolved Administrations, and some individual disciplines, such as archaeology and classics, rely significantly on EU funding contributions.

In all UK co-authored publications with a non-UK author, the US is by far the most frequent cooperative partner, while interactions with others, including China, have grown in recent years. Around half of UK business expenditure on R&D comes from foreign direct investment, making UK R&D more dependent than any other country in the G7 on inward investment. Of those overseas companies investing in the UK, there has been moderate increase in investment coming from companies owned in Europe and the US since 2007, but a large upwards trend in R&D investment from companies based in the rest of the world.

The essential next step for the UK is to ensure that the funding that was previously set aside as the UK's contributions to EU Horizon Programmes is protected and the levels of funding for R&D in the UK are, maintained, if not increased.

The report had a number of recommendations. On the assumption that a decision not to associate would take the wider economic and political implications into account and be made at a senior political level, Prof Reid and Prof Smith could see no convincing argument for simply replicating the system in Europe on a line by line basis in their vision for a future UK research base in the event that the UK did not associate.

As a first priority, UK must focus on protecting and stabilising its existing R&D capabilities before

decisions are made to invest in new schemes and before a framework for global collaboration is set out.

This is an opportunity for the UK to make bold moves towards an R&D spend of 2.4 per cent of GDP. Higher levels of business R&D investment from across the world will be a crucial aspect of this, and specific funding interventions should be set up to attract such investment to the UK.

The volume of international research collaboration occurring in the UK is far greater than the funding expressly allocated for the purpose of international research activity. There is a need to establish funding dedicated to improving the agility of the UK research base, to allow the UK to capitalise on fast-moving opportunities that the grant application process is not able to nimbly react to.

In the field of immigration policy, the attraction of talent must play a role alongside regulation of entry to the UK. The report called for much closer alignment between immigration policy and science and innovation policy and Prof Reid welcomed the announcement of Global Talent Visas the previous week as considerable progress toward this recommendation.

The report explores the elegantly designed European Research Council funding mechanism. In the event that the UK does not participate in the ERC in future, it proposes a flagship programme of research fellowships. In recognition of the challenging complexities involved in designing new funding systems, the report instead proposed principles and options for future funding. A much larger scale of international collaboration would need dedicated administrative machinery, which can develop national expertise in the craft of building international collaborations.

As negotiations with the EU proceed, it would be helpful to understand several issues: first, how the association decision will be arrived at, and the transparency and engagement the research community can expect in this process, must be defined. Secondly, HM Treasury must commit funding for essential work to protect and stabilise the UK research base now that the no-deal funding guarantee has lapsed. Thirdly, the optimum governance model for an agile funding model must be articulated. Finally, the right financial support for those research areas and geographical areas that stand to lose the greatest proportion of their funding. Ultimately, the UK faces a choice to between providing support in the transition, or allowing these areas to find their own place in a new world.

PROFESSOR DAME NANCY ROTHWELL DBE DL FRS FMedSci FBPhS set the scene with a recognition that science is often used as shorthand for research, but that this debate should include consideration of all research disciplines. Researchers are agnostic to national barriers; quality of research is what matters. The importance of international collaboration is is borne out in the much higher citations seen, in almost every discipline, in UK papers where there is an international partner. Clearly there might be many reasons for this; irrespective of these, international collaboration is undeniably important and Prof Rothwell focused her talk on the reasons for this.

Much research is inherently international; space weather, climate change or global diseases need international teams, funded internationally. UK research is already accomplished at research projects that are not focused on UK outcomes, for example in the research project Dams looking at the impact of dams in Africa.

The UK is not big enough to act alone in many research areas. Multinational teams like the European Flagships, the Graphene Flagship and clinical trial directives in rare diseases are examples of these. Maintaining the UK's participation in these extremely large and long funding programmes is essential.

Large research facilities are overwhelmingly beyond the ability of any single country to deliver. Some fall within international treaties such as the Large Hadron Collider and the Square Kilometre Array and will be unaffected, but the UK should seek to partner in others, for example in fusion technology and the European Space Agency.

Much social science research indicates that diversity per se has value and diverse teams often achieve much more. Both overseas experience for British scientists and international visitors to UK research groups bring valuable benefits in terms of training and skills.

Research is a wonderful vehicle to build bridges due to its tendency to ignore political barriers. The Sesame Synchrotron; a joint project between Jordan, Bahrain, Egypt, Iran, Pakistan, Turkey and Israel is a research endeavour that transcends politics and a powerful example of research diplomacy.

Prof Rothwell expressed her desire to secure association with Horizon Europe post-EU-Exit, and her agreement with the conclusions of the 2019 'Changes and Choices' report. Three areas of potential concern now for international collaboration are the impacts of geopolitics; the present, wide spread of infection; and the increasing social movement against flights as a method of transport. While Europe remains an incredibly important

partner, there are significant opportunities to work with other countries in addition to, rather than instead of, Europe that the UK should not ignore.

THE RT HON. CHRIS SKIDMORE MP thanked the wider science and research community for their dedication, extending even beyond their individual research fields, and highlighted the common purpose for the evening: that researchers, irrespective of where they come from, should have an opportunity to succeed. The conditions of success are not static and research and innovation offers a continual reminder to governments of the need for constant change in order to adapt for the future.

The global importance of the UK's research internationally is well documented; whilst representing only 0.9 per cent of the world's population, the UK accounts for 4 per cent of global research publications and over 15 per cent of the world's most highly cited research papers. Between 2007 and 2017 there has been a 70 per cent increase in foreign investment in UK R&D, making the UK the second most collaborative nation behind France.

The careful curation of an international research community in the UK has been a long undertaking. First and foremost, the UK's continued success in this area about people. The complex ecosystem depends on decades and layers of scientific achievement and relationships. Mr Skidmore noted the longevity of international research projects and the lifetime commitment that many have made to their research, and commended the commitment and humility of the researchers he has encountered.

In his tenure as Minister for Universities, Science, Research and Innovation, Mr Skidmore had published the international science and innovation strategy, commissioned the Adrian Smith/Graeme Reid review and published the national education strategy. Mr Skidmore also advocated for the Future Research People Strategy, announced the previous month, to make sure that the UK is supported in becoming the best place to do international research. Mr Skidmore expressed his personal commitment to continue to shape the policy debate, and take an active role in championing the vital importance of expanding the UK's international research opportunities.

Protection of UK R&D sector should be deemed synonymous with the national interest, making the relationship with EU on Science funding of great relevance and interest to the UK as a whole. A common understanding that the European research partnerships are too valuable to be jeopardised is encapsulated in the Withdrawal Agreement.

The UK has been the second largest beneficiary of Horizon 2020 and 35 per cent of the grants currently assigned would not be able to be accessed under third party arrangements. The UK must continue to make the case, both to the research community and to the wider public, that the direct and indirect benefits of international research contribution make this a debate of utmost interest to the taxpayer. Association agreements like that established with Israel demonstrate that this is possible, and there is a mutual interest in agreeing an association as soon as possible.

Mr Skidmore laid out their plans to help fashion a campaign to communicate the value of R&D to the UK, working with Universities, the academies and researchers themselves to demonstrate and explain the positive value of maintaining UK-EU partnerships and associating with Horizon Europe. While the UK is no longer a member of the EU, the importance the UK places on protecting its research partnership is at the core of the future relationship.

Mr Skidmore closed restating that this is the year of decision and that the discussion must become broader than a binary exchange between the European commission and UK Government. The speaker called for the research community to work together to highlight that it is in the British national interest to form an association agreement. The UK must extend its international partnerships at the same time as protecting those with Europe and the one should never exclude the other.

The **DEBATE** commenced with a discussion of what association with Horizon Europe could involve, and the former Science minister highlighted the importance of timing; given that the detail of Horizon Europe could take until 2021 to emerge, a funding gap could yet emerge in the coming year even in the case that the UK gains full association. To mesh with the timing of the research grant cycle and the required prior planning incumbent on Primary Investigators, the panel heard that a decision would need to be made urgently. Nevertheless, a statement of certainty on the UK's wish to associate would go some way to supporting researchers' plan. Whilst a consensus view exists on the merits of the European Research Council, and more evidence is recommended to support strategic discussions on the essential and desirable elements in a future Horizon Europe association agreement.

The panel noted the laudable ambition of the UK to associate. There remain challenges in articulating the benefits of association, as economic analysis struggles

to reflect the intangible benefits of some elements of this, such as regulatory alignment. Judgements of this kind should note be made on financial arguments alone.

Views differed on the importance of competition to nurture the development of globally innovative companies in the UK. Much as competition could encourage British universities to push for higher levels of foreign investment, the UK may be too small for the hyper-competitive research environment that has evolved, and real rewards may lie in the UK creatively assembling across research disciplines in both the sciences and the arts to identify and adapt to global challenges.

Improved coordination in government is needed to nurture global collaboration and present a coordinated front to the UK's international endeavours. The government's administrative machinery should aim to coordinate three key interests; the Foreign and Commonwealth Office and Department for International Trade in promoting the UK globally, the Home Office in its responsibility for immigration and the Department for Business, Energy and Industrial Strategy in setting the overarching science policy framework.

In tandem with considerations on funding research, it is important to consider continued funding to support innovation in small and medium enterprises that were previously supported by the European Small and Medium Sized Enterprise Instrument, which provided funding and European links. Amongst policymakers there exists a lack of awareness as to the extent to which Innovate UK funding often combined with Horizon 2020 and other funds, in particular in regional areas.

Historically the UK has tended to focus more on the research than on the development of R&D. This balance should be redressed. Collaborative innovation with other countries is a way to leverage both trade deals and inward investment, which plays a comparatively large role in the UK R&D base compared to other countries. The UK does not presently have a systematic understanding of the attraction the UK possesses for foreign companies; it is essential to speak to those already investing to understand this, in order for the UK to go on to demonstrate the need for successful companies to invest here. It was noted that the Foreign and Commonwealth Office's Science and Innovation Network has a role in this area, and the network would benefit from a more focused approach than the 100 countries advisers are currently scattered between 50 overseas locations.

The importance of the Erasmus programme was highlighted in the debate; European students coming to British institutions bring enormous value to UK research. Equally, the UK should become more internationally focused as a nation and must encourage young British researchers to study abroad. Currently the UK receives many more Erasmus students than it sends internationally, and the question remains whether the Horizon Programme principle that members cannot receive more than they contribute may be extended to the Erasmus programme.

A degree of public funding should be made available on profoundly different terms to the present system, albeit still managed within UKRI machinery. Different governance of public funding programmes is needed that allows a trade-off between a more liberal machine at a transactional level, allowing the UK to engage with overseas organisations whose rules are different to ours, alongside a tougher level of governance at the higher levels. In the longer term, incorporating existing mechanisms and institutions into a new system to emulate the successful US ARPA model, should afford researchers the freedom to fail, fail and go on to succeed.

The coming year will be critical for the UK to protect and stabilise its present research capabilities, to prepare funding for Horizon Europe and, only then, on a firm base of strong international collaboration, to look with confidence to bold new projects.

Marie- Louise Taylor

FUTHER READING

Changes and Choices – Advice of future frameworks for international collaboration on research and innovation, published November 2019, Report by Professor Sir Adrian Smith and Professor Graeme Reid https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844488/Changes_and_Choices.pdf

The UK's approach to Negotiations with the EU, published February 2020 (Horizon Europe, Euratom, Copernicus and Erasmus mentioned page 23, paras 20-21) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/868874/The_Future_Relationship_with_the_EU.pdf