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Written evidence for House of Lords Select Committee: 'The Relationship between EU Membership and the Effectiveness of Science, Research and Innovation in the UK' submitted by:

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Introduction

This response is from AIRTO (the Association of Innovation, Research and Technology Organisations). AIRTO's members comprise representatives from:

- Public Sector Research Establishments (PSREs)
- Non-profit distributing member and non-member based Research and Technology Organisations (RTOs including Catapults)
- Privately held research and technology companies (including Contract Research Organisations - CROs)
- Universities (Enterprise/Technology Transfer Departments)
- R&D (research and development) departments of industrial companies
- Business support (including Access to Finance) and early stage technology-based venture capital companies

AIRTO's members generally operate in the private sector, but with varying degrees of interaction and financial involvement from the public sector. All are to a significant extent involved in aspects of the translation of ideas, research and technological advances into the commercial arena, for clients in both the private and public sectors.

Overview

AIRTO welcomes the House of Lords Select Committee inquiry into 'The Relationship between EU Membership and the Effectiveness of Science, Research and Innovation in the UK'. Organisations in the Innovation, Research and Technology (IRT) sector play a pivotal role in driving economic growth and innovation, frequently acting as the aggregator of scientific and technological demand from businesses and markets. Such organisations typically work at the mid-level technology readiness levels (TRLs) and are well placed to understand company and sector-based innovation strategies, where they are optimally positioned to facilitate interactions involving academic partners, SMEs and large organisations to approach challenge-led innovation projects.

Britain has a large and thriving IRT sector, which contributes significantly to our national capabilities[1], with the economic impact for UK plc now estimated to stand at £32-36 Billion pa. The Research and Technology Organisations (RTOs) that AIRTO represents are a significant component of the UK's innovation ecosystem, but differ from universities in their primary objectives, strengths and capabilities, which are centred on commercial translation of applied research. In its 2011 'Innovation and Research Strategy for Growth', BIS recognised the sector as an 'under-utilised asset'[2]. RTOs have a vital role to play in leveraging EU funded research to drive economic growth. The best outcomes for the UK will be achieved by supporting RTOs and universities to work together, with businesses, to exploit opportunities presented by EU funding and collaboration. RTOs are well equipped to help companies seeking mid-TRL research capabilities, either on a self-sufficient basis or in conjunction with university partners.

AIRTO's response to the specific questions posed is as follows (with combined answers being offered to some questions):

1. What is the scale of the financial contribution from the EU to science and research in the UK? How does the financial contribution the UK receives compare with other member states in terms of, for instance, population, GDP, scientific strength or any other relevant indicators?

and

2. What is the scale of the financial contribution from the UK to the EU that supports science and research activities?

The UK makes up about 12% of the EU population and contributes 11.5% to the budget[4]. Science and innovation funding is awarded based on research excellence, meaning the UK punches above its weight, winning an estimated 16% of all the EU research funding under Framework Programme 7[4], and even more in some areas such as health (leading 20% of all projects[5] and winning 20% of the prestigious European Research Council funds[4]). The UK Government's investment in science is £4.7 billion annually (resource spend)[6]. The EU's budget for science is €10 billion per annum, 16% of which if won by the UK make at least an additional 24% on top of our total domestic science budget (public and private). This is large enough to make a significant contribution to the UK's resource and success. In addition, the EU Structural Fund, which this estimate does not take into account, contributes to our innovation resource and research infrastructure, as does our access to procurement programmes, e.g. the Galileo and Copernicus space infrastructure programmes. On balance, the UK extracts proportionally more than it invests in the EU for science and innovation. EU programmes also provide access to the outcomes from the totality of projects in which UK organisations engage, typically on a scale some six times larger than the financial quantum contributed from the UK. This permits the UK to share cost and risk on projects that would not be affordable on a national basis.

The evolving UK science and innovation and EU landscapes may position the UK to exploit EU funding opportunities even further in the future, e.g. through smart specialisation initiatives across the regions, offering a channel for further EU Structural Funds to innovate in the UK. Such a clustering of specialisations, e.g. in science parks, brings benefit beyond the financial contribution to UK research and innovation capacity, amassing cumulative concentrations of essential skills.

In the other direction, UK science and research leads Europe and contributes to the quality and competitiveness of European partner organisations to the benefit of the EU community and its place as a market for UK exporters.

3. What is the effectiveness and efficiency with which these funds are managed in the EU compared to the management of science funding in the UK? Particularly, when administrative overheads, quality of decision-making and advisory processes are considered?

The UK's management of funds, whilst robust, remains less burdensome for applicants and recipients of funding. Some bureaucracy is, of course, necessary for effective management and EU programmes are necessarily more complex because they are mainly aimed at international collaborations. Although some simplification has taken

place with Horizon2020, the balance between heavy financial audit and in-project technical and business level monitoring and support could still be further improved. However, it is vital to note that the benefits overall and the particular benefits for those participating in programmes that are EU funded are generally felt to far outweigh the drawbacks.

4. What are the benefits to UK science and research of participation in EU collaborations and funding programmes such as Horizon 2020 and the European Research Council?

The UK currently receives considerable funds and partnership opportunities from the EU through programmes like Horizon 2020 (which will invest 70bn Euros across Europe from 2014-2020).

Science has always benefited from cross-border collaboration and exchange of ideas. The EU programmes provide a framework for facilitating such science-based research collaborations. Furthermore, EU funds act as a mechanism to 'gear up' national resources (both public and private) available for science and collaboration stimulates innovation, application of research outcomes and drivers for new research.

Research outcomes, applications and impact are maximised by collaborations which are designed to include broad industry representation from multiple countries and market areas; and industry participation is assisted by the presence in consortia of science, research and innovation organisations such as RTOs, PSREs and universities.

EU programmes provide the UK with opportunities to lead large multinational collaborations that contribute to the infrastructures needed for international interworking and trade. A case in point is the EURAMET programme hosted by NPL. This is because science and innovation is globally competitive and basic science outputs from the UK measures well against competitor nations, with many of the world's top 200 research universities being British.

Furthermore, the UK now ranks second in 'The Global Innovation Index (GII)', placing the UK above the USA, Singapore and Germany for the third year running[3]. However, remaining competitive requires investment to sustain infrastructure, skills and expertise. European countries which are also important competitors and partners of the UK, like Germany and France, strive to maximise their investment in science and innovation via EC funds in addition to funding available from their domestic budgets.

EU funds provide for large scale activities and combinations of expertise across multiple countries, which Innovate UK and other domestic sources of funding cannot accommodate. Engaging in collaboration on this scale is not without challenges. Identifying non-UK partner companies to engage with can be difficult. However, the alternative of not being involved in would result in diminishing UK engagement in key strategic collaborations in sectors such as aerospace, medicine, transport, energy and agri-food, to the detriment of the nation's competitive performance.

6. How is private investment in UK science and research influenced by EU membership? Is international investment leveraged on the basis of this membership? How does EU membership affect the growth of research-intensive UK companies?

Considerable investment in science and innovation comes from private investment, including in start-up and other businesses trading on skills, generic knowledge and intellectual property from universities and other publicly-funded science. Participation in EU science and research programmes contributes to the research knowledge base, and hence the potential for private investment in collaboration with universities and other scientific research organisations which do engage with these programmes.

The EU overall has been successful in securing direct co-financing and other types of support from big businesses and industries for EU projects with a strong research and innovation dimension, but the UK private sector has not participated to the same extent as seen in many other EU member states. Part of the problem in the UK is poor understanding of the programmes and the opportunities, together with apprehension over collaboration with potential competitors and possible leakage of their IP. The level of effort required to apply and significant oversubscription are also deterrents. The official UK response has been to arrange workshops and meetings. This is not of itself sufficient and sometimes not adequately or correctly targeted. Exceptions to this are to be found in the

engagement of some of the major multinational companies; however, there are relatively few of them in the UK in the main areas of interest to the EU's programmes. This reflects the makeup of UK industry. It should be recognised also that there is a hierarchy of credibility associated with some funding sources amongst private investors - UK Government funding (e.g. Innovate UK grants) are better regarded.

To be effective, proposals for research and innovation support should be configured with exploitation of the outcomes as the main driver. This means ensuring that there will be paths for attracting further investment and pulling through exploitation in directions that will deliver the desired uptake, contributions to achievement of European Union (EU) objectives and growth, and jobs. Industry must be considered the main exploitation route for achieving this. To engage industrial interest there must be strong prospects of:

- Significant market potential for new products and services;
- Opportunities for securing a competitive edge (based on technology, a novel business model or the equivalent - opportunities for significant cost reduction in non-core areas can also be attractive to some companies and organisations);
- Securing protectable intellectual property;
- A perceived match to existing corporate strengths or the opportunity to develop desirable new strengths;
- Access to sufficient resources, skills and finance to undertake exploitation;
- Minimal complexity, bureaucracy and restrictions.

Trying to achieve the above whilst also seeking to encourage joint working between different entities in different EU states can complicate matters and dilute attractiveness to industry if the drive for collaboration is not handled carefully.

Not being involved in the EU, would however, lead to an increasing risk of funding and capacity being out of step with demand for innovation in the UK because:

- There would be a greater dependence of fewer streams of public funding, i.e. those from the UK Government only, with added uncertainty therefore from the impact of pressures on domestic budgets;
- It would deny a significant route for spreading risk for UK organisations engaging in science, research and innovation;
- The UK would lose the ability to influence European programmes – where efforts are being made increase engagement the result can be very positive, e.g. UK involvement in EU funded space programmes, where concerted efforts are being made by industry and Government working together.

Therefore, moving out of the EU would create greater reliance and pressure on domestic and private investment for science and innovation, and also increased risk and fewer options for risk mitigation for investors. It should also be understood that sources of funding combine over years to establish the centres of excellence and capability, often in universities, that attract private sector participation. Some of the established collaborations between universities, RTOs and industry could be seriously undermined or even unravel if EU funds were not available to underpin them, in the aerospace/space sectors, for example.

7. How does the UK participate in the creation and operation of international facilities that are available as a consequence of our EU membership? Are there any restrictions in the creation and operation of international facilities outside the EU as a consequence of our EU membership?

Participation in the creation and operation of international facilities within Europe are greatly enhanced by EU membership. Many such projects would not be eligible to UK organisations from outside of EU membership.

8. What contribution does EU membership make to the quality of UK science and research through the free movement of people? How does this compare with flows of people between the UK and non-EU countries such as the USA, India, China and Singapore?

The ability to join forces and resources to facilitate British involvement in big co-located projects, e.g. via ESA or CERN, is important, and the EU is a key mechanism for facilitating such collaborations. Keeping the UK central to

such programmes enhances skills and enriches the UK's IRT sector with opportunities for collaboration and career development, stimulating the interworking of scientists and engineers with other EU countries and, in many instances, an influx of talent to the UK. This movement of is arguably a positive factor is helping the UK to remain internationally competitive, as it contributes to enriching the experience, creativity and skills of the IRT sector workforce. An example of reliance upon skills from across the EU is seen from within our own membership where a number of organisations benefit from employing significant numbers of staff from the EU (excluding the UK), e.g. The National Physical Laboratory (NPL) currently employs 11% of its workforce from the EU (non-UK). Other high technology businesses are also increasingly dependent on recruitment from outside the UK to operate. The dedicated mobility programmes, like Marie Curie which supports transnational, intersectoral and interdisciplinary mobility, enhance international development opportunities for postgraduates and are therefore very helpful to both host partners and seconding organisations.

9. Does EU membership inhibit collaborations with countries outside the EU, for example by requiring the UK to adopt EU-wide immigration policies rather than bespoke ones for the UK?

and

5. What is the influence of EU membership on bilateral collaboration between the UK and other EU member states? Are collaborations with member states stronger than with non-EU countries as a result of EU membership? Or, are bilateral collaborations with member states inhibited by requirements to work through EU mechanisms?

EU membership does not inhibit collaborations with countries outside the EU, and indeed it can encourage such collaborations as non-EU organisations can join EU projects on a self-funding basis. However, by being an integral part of the EU, the UK can to be involved in shaping and directing research and innovation strategy and investment decisions on future programmes and sectors. Furthermore, through some programmes, the UK acts is a particularly attractive partner for other countries wishing to become involved in EU programmes (China and the USA, for example).

10. What are the key EU regulatory frameworks/mechanisms that directly affect the science and research community in the UK?

Regulatory mechanisms (including the UK's research excellence and other framework e.g. from BSI) can be a mechanism for stimulating research. Regulations from the EU are not necessarily more severe than from the UK, but in both instances it is necessary to ensure that rigorous and robust methodologies can be implemented to check compliance and in many instances new research is required to underpin this aspect of new regulation.

State aid rules within the EU do, however, impact on our ability to conduct translational research with the private sector, on allowable mechanisms for supporting commercialisation from the public sector and thereby on industry's willingness to take on the risk and cost of exploiting research outcomes.

11. If the UK were not a member of the EU, could regulations be reformed to give greater benefit to UK science and research? For example, in areas such as data regulation, VAT on shared facilities, and the use of the precautionary principle?

AIRTO does not offer a view on this question.

12. How is the innovation landscape affected by EU membership?

Innovation is frequently a product of engagement and partnership with other organisations from diverse backgrounds, which participation in such programmes with other EU member states and organisations helps to facilitate.

Furthermore, the UK innovation landscape in some areas, space for example, is intimately connected to EU research, development programmes and procurements. UK industry's competitiveness vis-à-vis other European member

states could in this context be significantly affected if the UK were to be absent from EU policy formulation and procurements, particularly where developing critical infrastructure is concerned, for Europe in particular, but also where there is potential relevance for other parts of the globe.

Note also that many of the larger players in the industry are multi-nationals headquartered outside the UK. Their R&D is largely concentrated on sites located in EU member states. The UK's membership of the EU strengthens the case for their inward investment in UK R&D, without which such R&D might well be undertaken elsewhere.

13. How does the quality and effectiveness of scientific advice on matters of public policy compare between the EU and the UK? What are the effects, if any, of differences in the provision of scientific advice between the EU and the UK?

and

14. To what extent does EU membership enable UK scientists to inform and influence public policy at EU or international levels? To what extent does EU membership inhibit UK scientists from influencing public policy at EU or international levels?

EU consultation processes are quite comprehensive. The UK does not always translate the opportunities for consultation into effective national engagement with such processes. There are UK consultations for gathering views but they seem to focus on bureaucracy and mechanics rather than politics and programme content. The UK industry stakeholder communities in particular seem weak at understanding how the EC's strategic advice and consultation processes operate, at getting involved, and at making the effort to make a difference. There are exceptions to this in some sectors, such as aerospace. These exceptions are usually based on the large companies getting involved and influencing programme content accordingly, often through involvement in committees. More could be done to support and stimulate UK involvement in such decision making structures.

Improvements could be based on increased levels of resourcing and engagement within BIS and greater communication/transparency of the Commission's processes and workings into the private sector by BIS (but that will cost more in the public sector).

In general, the EC should undertake its own independent research into the needs of the market, remaining objective and mindful at all times that those who are consulted do not represent more than a modest fraction of those who will eventually be affected for 5 or even 10 years into the future. Generally, at least a year will elapse between the input from stakeholders and a call for proposals, at least another year between the publication of the call and projects starting and at least another three to four years between then and the start of commercialisation. Having over-prescriptive calls is therefore a recipe for potential obsolescence of the resulting end-products. Many EC proposals in the past have veered into prescriptiveness, attempting to define how results should be achieved instead on concentrating on defining broad areas in which research could profitably be undertaken.

Experience varies from sector to sector but, in some areas, the input of stakeholders can, if anything, have too much weight; this leads to calls for proposals which are too obviously biased towards special interests, too short-sighted and too narrowly defined, not just in terms of what needs to be done but also in terms of how to achieve those aims. The consultation process should not be simply a mechanism to generate the call text by a 'cut-and-paste' process which adds up all received contributions; instead, it needs to start with a principled set of long and medium-term aims and use consultations to clarify those aims, extending them or re-formulating them as needed but without succumbing to short-termism and special interests. The EC could therefore usefully make a more determined effort to assess the needs of the market and the lacunae in knowledge independently; it should stay at all times above the potential influence of lobbying activities and ensure that consultation helps steer the process of defining proposals but does not commandeer it.

The scoring for selection of projects for funding within current frameworks is perceived as somewhat random by commercial organisations when receiving feedback on submitted proposals. The high cost of preparing proposals therefore tends to favour larger organisations that can take a statistical perspective on the probability of securing

funding over a large number of project applications. The implication of this is that true innovation is not the driving factor for success, but rather the skill of a lead organisation in attaining the requisite shape for a consortium, and using the appropriate key words in proposals. There is a need to increase involvement of industry scientists in the evaluation processes for proposals.

Overall the UK is better at utilising advice for public policy than the EU (in our opinion). However, the existence of large programmes can add huge weight of validity to the evidence produced to inform public policy. In contrast, the larger the community that is targeted for influencing regarding policy formation, the more complex the task becomes – e.g. on climate change – the sheer volume of stake holders makes the task of influencing policy highly complex and lengthy.

Declaration of interests

This submission is made by the Association of Innovation, Research and Technology Organisations (AIRTO). The organisation represents research and technology organisations operating in the space between the academic research of universities and the commercial needs of industry. AIRTO members undertake research and development, and knowledge and technology transfer. This submission does not necessarily represent the views of individual member organisations. AIRTO currently comprises organisations, employing more than 40,000 scientists and engineers[1], with a combined annual turnover in excess of £5billion (AIRTO Ltd. is a company limited by guarantee registered in England No. 1217006 Register office address: National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW). AIRTO is a not-for profit organisation funded by membership subscriptions, and managed under contract by NPL Management Ltd. The members of AIRTO currently are:

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