Summary
The UK research base is internationally recognised as one of the strongest in the world in performance and efficiency. The UK needs to seek clarity and certainty for current and future participants in, and recipients of, the UK’s research and innovation efforts. The UK Government must ensure that the UK’s leading position in research is maintained. The RSE believes that the following aspects will need to be secured in order to ensure that the UK’s research, innovation and tertiary education system remains internationally competitive throughout the Brexit negotiations and thereafter following the UK’s departure from the EU.

> As an immediate priority the UK Government needs to provide assurance that the existing rights of EU nationals in the UK will be protected, and to argue for the rights of UK nationals working and studying within the EU. While the Prime Minister’s meeting with EU leaders on 22 June demonstrates a commitment to make these issues a priority for the negotiations, which we welcome, the post Brexit status of these citizens remains uncertain.

> To maintain the ability to attract EU and international staff and students to UK universities, including those in Scotland, in order to retain the international, outward facing reputation of our higher education institutions, the UK Government needs to:

- Confirm soon the basis upon which post-2019 cohorts of EU undergraduate and postgraduate students will be able to study in the UK.
- Remove international students from the net migration targets to make clear that talented individuals are welcomed by the UK.
- Work with the Scottish Government to reintroduce the post-study work visa in Scotland.
- Work with the Scottish Government to ensure that UK and Scottish-based students and staff continue to be able to benefit from exchange programmes, including Erasmus+.
- Ensure that the immigration system is proportionate, fit-for-purpose and easy to operate.
- Ensure that UK nationals have the ability to spend part of their career outside the UK, including in Europe.
It is crucial that the UK including Scotland achieves the closest possible association with the EU research system, which is driving innovation, contributing to the national economy, and the critical mass which it supports by:

- Ensuring that structures exist to enable UK and Scottish-based researchers to continue to be able to undertake collaborative research with European and international partners, including participation in the European Research Council.
- Giving priority to securing the UK and Scotland’s continued participation in EU-funded research programmes, including Horizon 2020 and subsequent Framework Programmes.
- Maintaining the UK’s influential role in shaping the EU research and innovation agenda.
- Ensuring that there is no funding detriment for UK research and innovation resulting from the UK’s departure from the EU. Noting, however, that maintenance of the funding position for UK research would not compensate for the potential reduction in collaborative activity should the UK be unable to retain full access to EU research programmes.
- Maintaining, and improving on current incentives to deliver an innovation-based economy, capitalising on publicly funded research outcomes.
- Ensuring access to and influence upon major international facilities for research, innovation and scholarship.

The UK needs to retain overall equivalence with the EU regulatory system to maximise the potential for the UK’s continued access to EU markets post-Brexit. There could be opportunities for the UK to modify some of the standards and guidelines that are in place to make them more proportionate to the risks and benefits of innovation, while still ensuring adequate protection of health, well-being, species diversity and the environment. The success of UK and EU level initiatives to support innovation will depend on our ability to develop more proportionate and adaptive regulatory systems in future.

Introduction

1. The Royal Society of Edinburgh (RSE) has established a European Strategy Group to provide strategic advice on the implications of the UK leaving the EU. Drawing upon the multi-disciplinary expertise of the RSE Fellowship and the membership of the RSE Young Academy of Scotland, RSE working groups have been set up to undertake detailed work in key areas of policy. Given its commitment and support for research, innovation and scholarly activity undertaken in and from Scotland, one of the RSE working groups will focus on Research, Innovation and Tertiary Education. This paper articulates the working group’s initial views on the place of research, innovation and tertiary education in the context of Brexit. The RSE’s EU working groups will closely track Brexit developments with a view to making further input to help inform the negotiations.

2. The Young Academy of Scotland and the RSE have also initiated joint work aimed at gathering data and case studies from researchers and higher education staff on their experiences and perceptions of the impact of Brexit on their work. The information received will be made available to policy makers as well as published on the Young Academy website.

Collaboration

3. The free movement of people among EU member states has enabled highly productive research collaborations. Researchers and innovators want and need to work with the best in their field, irrespective of where they are located, or with which institution they are affiliated. Collaboration facilitates this. Research has highlighted the value of collaborative activity, whereby nearly 50% of the UK’s scientific publications have non-UK authors and the impact of these papers is significantly higher than the average impact of UK papers. Almost 60% of these collaborations are with European partners. We therefore welcome the Prime Minister’s statement on the UK Government’s negotiating objectives for exiting the EU that emphasises the importance of maintaining collaborative research and innovation with European partners.
Collaborative activity often extends beyond the completion of the specific project upon which it was founded. This can enhance the research effort by enabling UK-based researchers to maintain valuable links with research networks.

The RSE recommends that mechanisms are put into place to ensure that the collaborative nature of UK research and innovation continues.

Maintaining and enhancing competitiveness for UK research and innovation requires:

- Achieving the closest possible association with the EU research system.
- Ensuring that UK-based researchers continue to be able to undertake collaborative research with European and international partners.

People

Researchers, Innovators and Academic Staff

The reputation of universities in the UK is partly predicated on their ability to recruit and retain the highest quality staff from across the globe. Higher Education Institutions in the UK compete internationally to recruit from what is a highly mobile talent pool. A recent report commissioned by the Royal Society, London, highlights the importance of mobility to research effort, with 79% of the researchers surveyed indicating that there is an expectation for researchers to be internationally mobile. The development of research networks is the primary motivation for their mobility.

The UK’s research and higher education landscape relies heavily on the contributions made by EU and international staff. Over a quarter (29%) of the 201,380 academic staff in the UK are non-UK nationals. In 2015-16, EU staff comprised 17% of the total academic workforce, while 12% were from outside the EU. Universities Scotland has highlighted that 23% of Scotland’s research-only staff are from the EU. In order to maintain its international research and innovation competitiveness, it will be crucial to ensure that the UK continues to be seen as being ‘open for business’. Any outcome which results in UK institutions being viewed as a less desirable environment in which to work will clearly hinder this.

A survey of its members by the University and College Union (UCU) in early 2017 highlights that over three-quarters (76%) of EU academics at UK universities said that in light of the referendum result, they were now more likely to consider leaving the UK higher education sector.

Against this backdrop and as a means of providing certainty, the RSE firmly believes that the UK Government should give an immediate assurance that the existing rights of EU nationals in the UK will be protected. More broadly, the Government needs to ensure that the immigration system is proportionate and easy to operate, facilitating the UK’s ability to continue to participate in research and innovation at the highest international level. It should be noted that this applies not only to researchers and academics, but also other vital staff such as technicians.

Maintaining and enhancing competitiveness for UK research and innovation requires:

- Sending a clear message that the UK remains ‘open for business’. Any outcome which results in UK institutions being viewed as a less desirable environment in which to work will clearly hinder this.
- Ensuring that the UK and Scotland’s higher education institutions continue to be able to recruit mobile staff from what is a global talent pool.
- The UK Government to provide immediate assurance that the existing rights of EU nationals in the UK will be protected, and that it will argue for the rights of UK nationals currently working and studying in the EU.
- The UK Government needs to ensure that the immigration system is proportionate, fit-for-purpose and easy to operate.
Students

The UK maintains a strong interest in attracting international students to our institutions. These students not only strengthen higher education institutions through their talents, intellectual curiosity and drive, but are also in a position of potentially holding influence across the world in future years. The internationalisation of Scottish universities, through the attraction and retention of international students, contributes to the aim of Global Citizenship, and has the potential to make graduates more globally and culturally aware, and therefore more employable. It greatly enhances the outlook and cultural awareness of home based students, enriching the entire university experience. Additionally, international students play an important financial role for UK Higher Education Institutions (HEIs) through their fees, especially in terms of supporting the provision of a range of postgraduate programmes.

With the increased focus on widening participation, there are more students coming to university for whom extensive travel or study abroad may not be financially viable. For these students, the internationalisation of home university campuses provides the opportunity for gaining a global perspective and achieving the goals of global citizenship without the prohibitive costs of travel.

In its recent report the House of Commons Education Committee has stated that the UK has been the most popular destination for students from the European Economic Area wanting to study abroad. As at 2015–16 a total of 127,440 EU students were studying at UK higher education institutions, of which 20,945 were studying at Scottish institutions (representing 16% of the UK total of EU students). Recent research by Oxford Economics on behalf of Universities UK shows that overseas students are worth over £25bn pa to the UK economy. Overall, 22% of the student population in Scotland comprises EU nationals (non UK) and international citizens. This reflects the attractiveness of Scotland as a place to study and live for EU and international students.

EU nationals studying in the UK have the same rights as home students, including paying the same tuition fees as home students. In England, annual tuition fees for undergraduate UK and EU students of up to £9,250 can currently be levied by institutions, while in Scotland undergraduate course fees for Scottish-domiciled and EU students (but not those from other parts of the UK) are funded by the Scottish Government. UCAS data published in February 2017 shows that the EU applicant figures to UK universities have decreased by 7% compared to the same point last year. The number of EU applicants applying to study in Scotland has decreased by 4% during this period.

Both the Scottish and UK Governments have confirmed that the cohorts of EU entrants for 2017-18 and 2018–19 will retain their fee status and eligibility for the duration of their studies. We welcome these assurances. However, there is a pressing need to confirm the future position beyond 2019 in order to provide certainty to prospective EU undergraduate and postgraduate students as well to enable UK universities to plan accordingly. With reference to the preceding paragraph, if changes are made that mean future cohorts of EU students to the UK, including to Scotland, are required to pay full international fee rates, then it seems clear that entrant numbers from the EU will reduce further. The Russell Group has cautioned against making the assumption that any reduction in EU students can be replaced easily by UK domestic students given the low year-on-year growth of UK students at UK universities.

Current UK immigration policies and the removal of the post-study work visa in 2012 are having a detrimental impact on the ability of Scotland’s universities to attract international students and for them to remain in Scotland following their studies. The RSE supports the reintroduction of the post-study work visa in Scotland, especially as the freedom of movement of EU citizens in future remains in doubt. It is unjust that the post-study work visa pilot scheme introduced in the UK in 2016 only included four universities, none of which are in Scotland.

The RSE agrees strongly with the recommendation made by a number of UK Parliamentary Committees that the UK Government should remove overseas students from the net migration target to make it clear it wants talent to come to the UK.
Maintaining and enhancing competitiveness for UK research and innovation requires:

- Being able to continue to attract EU and international students to UK universities in order to retain the international, outward facing reputation of our institutions.
- Reintroduction of the post-study work visa in Scotland, especially as the freedom of movement of EU citizens in future remains in doubt.
- Confirming soon the basis upon which post 2019 cohorts of EU undergraduate and postgraduate students will be able to study in the UK.
- Providing certainty to the UK’s higher education institutions on these issues so that they can plan accordingly.
- Removing international students from the net migration target to make clear that talented individuals are welcomed by the UK.

International Exchange Programmes

Scotland’s universities have an important role in developing a global mind-set among their students, including through the continued attraction of international students which enriches the learning and cultural experience at Scotland’s universities. The EU-funded Erasmus/Erasmus+ programmes have provided students at UK higher education institutions with an opportunity to experience a fixed period of study or work at another EU institution. This has provided Scottish students with opportunities to gain valuable insights into other cultures and enhanced their graduate employment prospects. More than 1,600 students from Scottish HEIs participated in a study abroad opportunity through Erasmus+ in 2014–15 with Scotland awarded 11.7% of the total Erasmus funding (£363m) awarded to the UK that year. Opportunities for increasing UK students’ global exposure should be explored and the UK and Scottish Governments should work together to ensure that students in Scotland and across the UK continue to be able to access Erasmus+.

Research and Innovation Funding

The UK has been very successful in securing competitive funding from the EU Framework Programmes for Research and Innovation. These have helped provide for a long-term, transparent and consistent research funding landscape. Horizon 2020 (H2020), operating from 2014 to 2020, represents the largest ever European funding programme for research and innovation, with a budget of £79 billion euros. Most of the H2020 funded projects are collaborative. The UK is a net beneficiary of H2020. Table 1, below, shows that the UK has had the highest number of eligible applications for H2020 and is second only to Germany in relation to total funding secured. The UK does however rank first for funding secured by its higher education institutions.

Table 1
Statistics for UK participation in Horizon 2020

<table>
<thead>
<tr>
<th>UK Performance in H2020</th>
<th>UK % of Funding Available</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall HEI</td>
<td></td>
</tr>
<tr>
<td>EU Funding / € M</td>
<td>3,266</td>
<td>2,088</td>
</tr>
<tr>
<td></td>
<td>15.4</td>
<td>25.5</td>
</tr>
<tr>
<td></td>
<td>2nd</td>
<td>1st</td>
</tr>
<tr>
<td>Participants</td>
<td>6,485</td>
<td>3,720</td>
</tr>
<tr>
<td></td>
<td>12.8</td>
<td>22.4</td>
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The UK has been particularly successful at attracting funding from the European Research Council (ERC) and from the Marie-Sklodowska Curie Actions (MSCA), both of which are awarded on the basis of scientific excellence.
Over the period covered by Framework Programme 7, between 2007–2013 UK-based researchers were awarded ERC funding totalling €1.67 billion, which represents 22.4% of the total available, and more than any other country. Over the same period, UK-based researchers were awarded €1.09 billion of MSCA funding, which was more than a quarter (25.5%) of the total budget. Again, the UK was the top performing country. Fierce competition for EU funding drives up research standards for all participants.

20 In terms of Scottish performance, as at February 2017 Scottish participants had secured funding totalling £296m from H2020, and £729m from FP7. Recent research commissioned by the UK national academies confirms that of all the UK nations Scotland receives most per head of population from H2020.16

21 Not only has the UK been successful at securing competitive EU research funding, but given the standing of its research base, the UK has played a prominent role in influencing the EU’s research funding agenda. This has helped to ensure that ERC funding continues to be allocated on the basis of scientific excellence. UK-based scientists have also secured high-level advisory roles in shaping EU scientific policy.

22 H2020 has sought to substantially streamline the EU funding landscape by bringing together research and innovation. H2020 has provided a means for increasing collaboration between businesses and the research community and for addressing the long-standing issue of the low level of business R&D in Scotland. This seems to have been a positive development for Scotland as there are indications of increased industry engagement so far under H2020 as compared to the previous framework programme.17

23 The RSE firmly believes that the UK’s continued participation in H2020 should be a priority objective for the negotiations.

24 Reflecting on our earlier comments on the need to ensure that the UK remains attractive to EU researchers, it is important to note that research grants, such as those awarded by the ERC are portable, whereby the money follows the researcher and is not linked to the host institution.

25 While the Treasury has confirmed that it will underwrite funding for all EU funding awards while the UK remains a member of the EU, the future for research funding following the UK’s departure from the EU remains uncertain. It is essential that our withdrawal from the EU does not lead to a decline in overall public funding for UK research. Should the UK Government be unable to secure the UK’s continued participation in EU-funded research programmes once the UK has left the EU, the Government will need to put in place provisions that safeguard funding at levels currently obtained from EU and domestic sources.

26 It is notable that the majority (36.7%) of the H2020 funding is directed towards research aimed at addressing ‘Societal Challenges’, including health, demographic change and wellbeing; food and energy security, and action on climate change. These challenges cannot be addressed by researchers working in isolation. They are reliant upon collaborations among interdisciplinary teams of researchers spread throughout the EU. It is therefore crucial that UK and Scottish-based researchers can continue to participate in these collaborations.

27 Research will fail to have an impact on these challenges if it is not translated into societally useful and economically viable innovation, and this is increasingly being recognised in the EU through the adoption of an Innovation Principle18 and plans for a European Innovation Council to emulate the success of the ERC.19 An important part of the EU supportive infrastructure for small innovative companies is the European Investment Bank (EIB) and its JEREMIE initiative (Joint European Resources for Micro to Medium Enterprises).20 It will be important to ensure that loss of innovation-support funding schemes, lack of free movement for talented entrepreneurs and other technical and regulatory restrictions do not make it difficult for start-up companies to come to the UK, or for indigenous companies to flourish and grow here.

28 The ERC provides funding for long-term blue skies research. The level of competition drives up standards and provides one of the most highly regarded funding schemes in the world. Although funding for such research could be provided from the UK, the prestige associated with it would drop dramatically. This drop in prestige associated with the reduced mobility of successful applicants would severely diminish the attractiveness of holding such a grant in the UK.
Even if the UK Government can provide assurances that funding for UK research will not suffer as a result of Brexit, this will not compensate for the potential loss of the added value gained from full UK participation in EU programmes, especially the benefits accrued through collaborative activity, where the critical mass for research provided by the EU is crucial.

Maintaining and enhancing competitiveness for UK research and innovation requires:

- Priority to be given to securing the UK and Scotland’s continued participation in EU-funded research programmes, including Horizon 2020. This should not only consider securing continued UK access to EU funding programmes, but also maintaining the UK’s role in shaping the EU research and innovation agenda.
- Ensuring that UK and Scottish-based researchers can continue to participate in EU research and innovation collaborations as well as in the ERC.
- No funding detriment for UK research and innovation resulting from the UK’s departure from the EU. Noting, however, that maintenance of the funding position for UK research would not compensate for the potential reduction in collaborative activity should the UK be unable to retain full access to EU research programmes.
- Maintaining, and improving on current incentives to deliver an innovation-based economy, capitalising on publicly funded research outcomes.

Access to EU Research Infrastructure and Facilities

EU membership enables UK researchers shared access to major EU-funded research infrastructure and facilities based throughout the EU. Their scale and capital-intensive requirements are such that they could not conceivably be developed and maintained by an individual member state. The terms upon which UK-based researchers would be able to continue to access EU research facilities would need to be negotiated, as would the future of those, such as the JET Torus, based in the UK. It is worth noting that the UK’s access to research structures external to the EU, for example, CERN’s Large Hadron Collider, operate by way of intergovernmental arrangements.

Regulatory Environment

Very large numbers of EU regulations, supported by standards and guidelines, currently ensure the safety, quality and efficacy of innovations arising from basic research. There are, for example, more than 100 EU regulations and directives that cover the chemical sector alone. To continue trading in EU markets post-Brexit, it will be in the interests of the UK to continue to meet these EU regulatory requirements. However, the EU and national governments have now recognised that many of these regulatory systems are insufficiently flexible and unable to adapt to the needs of 21st century innovative technologies. The Innovation Principle referred to above is complemented by policy initiatives requiring regulators to ensure that regulatory systems are adaptive to the needs of innovative technologies and proportionate to their risks and benefits. There will be opportunities for the UK to modify some of the standards and guidelines that are in place to support compliance with a regulatory system to make them more proportionate to the risks and benefits of innovation while still retaining overall equivalence with the EU regulatory system. In a few cases, where the EU regulatory systems have become excessively politicised, e.g. deliberate release of GM organisms, it would be appropriate to consider modelling UK regulatory systems, post-Brexit, on those of other important trading partners such as the USA, while still ensuring adequate protection of health, well-being, species diversity and the environment. The success of UK and EU level initiatives to support innovation will thus depend on our ability to develop more proportionate and adaptive regulatory systems in future. The UK Government should attempt to acquire maximum flexibility in its governance and regulatory systems with this outcome in mind, while retaining freedom to access important international markets. Effective regulation of the integrity of basic research it will benefit most from continuation of a pan-European approach.
Maintaining and enhancing competitiveness for UK research and innovation requires:

1. Retaining overall equivalence with EU regulatory requirements in order to maximise the potential for the UK’s continued access to EU markets post-Brexit.
2. Regulations and related policies which are adaptive to the needs of innovative technologies and proportionate to their risks, while still ensuring adequate protection of health, well-being, species diversity and the environment.

Additional Information
This Advice Paper has been signed off by the RSE’s EU Strategy Group.

Any enquiries about this Advice Paper should be addressed to Mr William Hardie
(email: whardie@theRSE.org.uk)

Responses are published on the RSE website (www.rse.org.uk).

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Endnotes
1 Background information about the RSE’s EU work streams is available from:
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