UK research and the European Union

The role of the EU in international research collaboration and researcher mobility

THE ROYAL SOCIETY

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UK research and the European Union:
The role of the EU in international research collaboration and researcher mobility

Working group
Professor Carlos Frenk FRS
Sir Tim Hunt FRS FMedSci
Dame Linda Partridge DBE FRS FMedSci
Dame Janet Thornton DBE FRS FMedSci
Professor Terry Wyatt FRS

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UK research and the European Union: the role of the EU in international research collaboration and researcher mobility

Between 2007 and 2014, the EU's Marie Sklodowska-Curie Actions supported 3,454 UK-based researchers to move within the UK, to other EU countries and to non-EU countries.

The European Research Council (ERC) has established a very strong international reputation and encourages researchers from outside the EU to apply for grants to work in its participating countries.

A referendum on the United Kingdom's membership of the European Union (EU) will take place on 23 June 2016. This report sets out to show the role of the EU in UK-based researchers' international collaborations and mobility.

This is the second part of a phased project gathering evidence about the influence of the UK's relationship with the EU on research. It is intended to inform debate. The first phase looked at the role of the EU in funding research and the third phase focuses on the role of the EU in research regulation and policy.

Science today is almost always complicated and often interdisciplinary, frequently requiring contributions from a variety of participants based in different places. Researchers collaborate to pool intellectual and physical resources. They tend to seek the best and most appropriate partners they can, wherever in the world they may be found.

In 2015 over half of the UK's research output was the result of an international collaboration and these collaborations are increasing – both in absolute terms and as a proportion of the UK's research output. 60% of the UK's internationally co-authored papers are with EU partners, an increasing share of the UK's international publications. Looking at individual countries, UK-based researchers most frequently partner with scientists from the US, with seven EU countries also among the UK's top ten strongest collaborators.

Mobility is often an important part of collaborating – enabling researchers to meet or share equipment, or spend time working in other facilities. This can be for short term visits or for longer term appointments. The EU's 'free movement of workers' principle makes it easy for researchers to move within the EU, compared with the immigration rules and regulations that they have to comply with around the world – Box 5 provides a summary of immigration rules and regulations that researchers must comply with to work in different countries.

The EU also actively supports researcher mobility, both within the EU and to non-EU countries. Between 2007 and 2014, the EU's Marie Sklodowska-Curie Actions supported 3454 UK-based researchers to move within the UK, to other EU countries and to non-EU countries. This scheme also funds researchers to come and work in the UK. For example around 800 Chinese nationals were supported to work in the UK, complementing the around 850 UK-based researchers who were funded to work in China.

This international mobility contributes to the UK's highly international research workforce; 28% of academic staff in UK universities are non-UK nationals (16% EU and 12% non-EU), as are half of PhD students. Between 1996 and 2011 7.6% of UK-affiliated researchers worked in other EU countries but not outside the EU for more than two years and 13.3% worked for more than two years outside the EU.

As well as supporting mobility, the EU has set out to create a European Research Area to improve the effectiveness of national research systems and their co-operation and competition. The EU actively supports international collaboration, within and beyond the EU. It does this through many different funding schemes, by facilitating the use of shared infrastructure and by supporting collaborative projects. The majority of EU Horizon 2020 research funding requires international collaboration and it also attracts non-EU countries to contribute financially to enable their researchers to take part.

The European Research Council (ERC), which is part of Horizon 2020 and funds frontier research purely on the basis of scientific excellence, has established a very strong international reputation. The UK is the top performer among participating countries in accessing these funds. Researchers from around the world can access ERC funding to carry out research in its participating countries and the ERC encourages researchers from outside the EU to apply for grants to work in these countries. Although this funding stream does not require international collaboration, 58% of papers with ERC funding have co-authors who are based in other countries.

There are a number of other national and international agencies that work independently of the EU to support researchers to collaborate and move internationally. For example the UK government's Newton Fund facilitates bilateral exchanges of researchers between the UK and 15 partner countries.

It is important to recognise that many factors, both professional and personal, influence researchers' decisions to collaborate and move. Due to this complexity, it is not possible to quantify how patterns of collaboration and mobility might change if the UK were to leave the EU. However, it is clear that the EU plays a major role in supporting international collaboration and mobility through a number of globally recognized schemes and agreements, and withdrawal of the UK from the EU could affect the UK's access to them.

Should the UK choose to leave the EU, applying to become an Associate Member of Horizon 2020 could allow UK-based researchers to access many of these schemes, depending on the terms of the agreement and subject to a substantial financial contribution. In this case, however, UK legislators would have no role in decisions over how this money was spent. In addition, any change to the UK's adherence to the EU free movement of workers principle could adversely affect the UK's eligibility to take part in EU research funding schemes, as has been seen in Switzerland. This would also influence the immigration rules and regulations with which researchers entering or leaving the UK would need to comply.

Given the high level of international collaboration and mobility within the UK's research base and the significance of the EU's role in supporting and facilitating these, it is important to consider the impact of any changes to the UK's relationship with the EU on future scientific collaboration and UK-based researchers.

Why is it important to consider the role of the EU in researcher collaboration and mobility?

Recent decades have seen significant increases in global competition between countries to attract skilled migrants.

In a world in which research is carried out on a truly global basis, international interaction is important to scientific success[1]. The UK is a world leader in science, and researchers move (see Box 1) and collaborate (see Box 2) to pursue scientific excellence; collaboration and mobility are a key part of the business of science, and they are distinct and complementary.

Mobility ensures a circulation of skills and ideas around the world[2], and 'brain circulation' in the global research system sees scientists follow the best science and the best resources[3]. Recent decades have seen significant increases in global competition between countries to attract skilled migrants.[4]

Scientists have a long history of working together, but the level of international collaboration is increasing. When UK-based researchers publish internationally-collaborative papers, they are more highly cited, a measure of scientific impact, than papers published by only UK-based authors[6]. This gap has widened over time.

It is important to understand the role that the EU plays in the UK research landscape to give an insight into how a changing relationship with the EU might affect this. This report considers the extent and value of collaboration and mobility in UK science, and the role that the EU plays in supporting this. It focuses predominantly on collaboration and mobility of UK-based academic researchers.

Although collaboration and mobility are also important to researchers in industry and students, specific mechanisms to support their collaboration and mobility are not covered in this report. However, they and their work may be counted in some of the analyses.

BOX 1 Why are researchers internationally mobile?

To collaborate internationally
Mobility allows researchers to share specialist expertise, skills or equipment and expand their collaboration networks. Collaborations can happen remotely, but often mobility is required to facilitate productive collaboration. Collaborations can also be an outcome of periods spent in other countries for work.

To develop their careers
Working with different researchers and joining up with the best research groups, wherever they are found, can help scientists to develop their experience. Internationally-mobile researchers produce more papers on average than those who have only ever worked in the UK[7].

To build international networks
Mobility helps to build the networks through which science progresses. The Society's 2011 report Knowledge, Networks and Nations[8] provides detail of the international nature of science, and the ways in which mobility builds networks.

To build the UK's soft power
The scientific community often works beyond national boundaries on problems of common interest, so is well placed to support diplomatic efforts that require non-traditional alliances of nations, sectors and non-governmental organisations. This is known as science diplomacy[9].

BOX 2 Why do UK researchers collaborate internationally?

To work with the best
To progress their science, researchers seek to work with the most outstanding experts in their field, or indeed other fields, many of whom will not be based in the UK[10]. Collaborations allow scientists to access skills and knowledge that complement their own, stimulating new ideas and developing expertise.

To gain access to state-of-the-art equipment
Cutting edge scientific equipment is expensive; it may be first available only in one country, or it may be affordable only if a number of countries combine together to pay for it. Scientists often gain access to this equipment for their research through collaboration.

To pool resources and reap benefits of scale
Global scientific achievements demonstrate the value of collaboration on big projects. The human genome was sequenced in just 13 years through the Human Genome Project[11]. The Higgs Boson was discovered in 2012 using experiments built by large international collaborations at the international accelerator centre CERN, and exploiting computing power provided by a collaboration of 170 centres spread across 42 countries[12].

To tackle global challenges
International collaborations can enable the research base to tackle global challenges and act quickly in emergencies, such as when there was an outbreak of Ebola in West Africa in 2013. Charities, government and industry worked together globally to respond to the crisis[13,14].

Snapshot of the UK research workforce

28% of academic staff in UK universities are non-UK nationals (16% EU and 12% non-EU), as are half of PhD students.

How mobile is the UK research workforce?

International mobility has shaped the UK research landscape. Researchers travel from the UK to work in the EU and the rest of the world, and foreign researchers, including those from the EU, come to work in the UK.

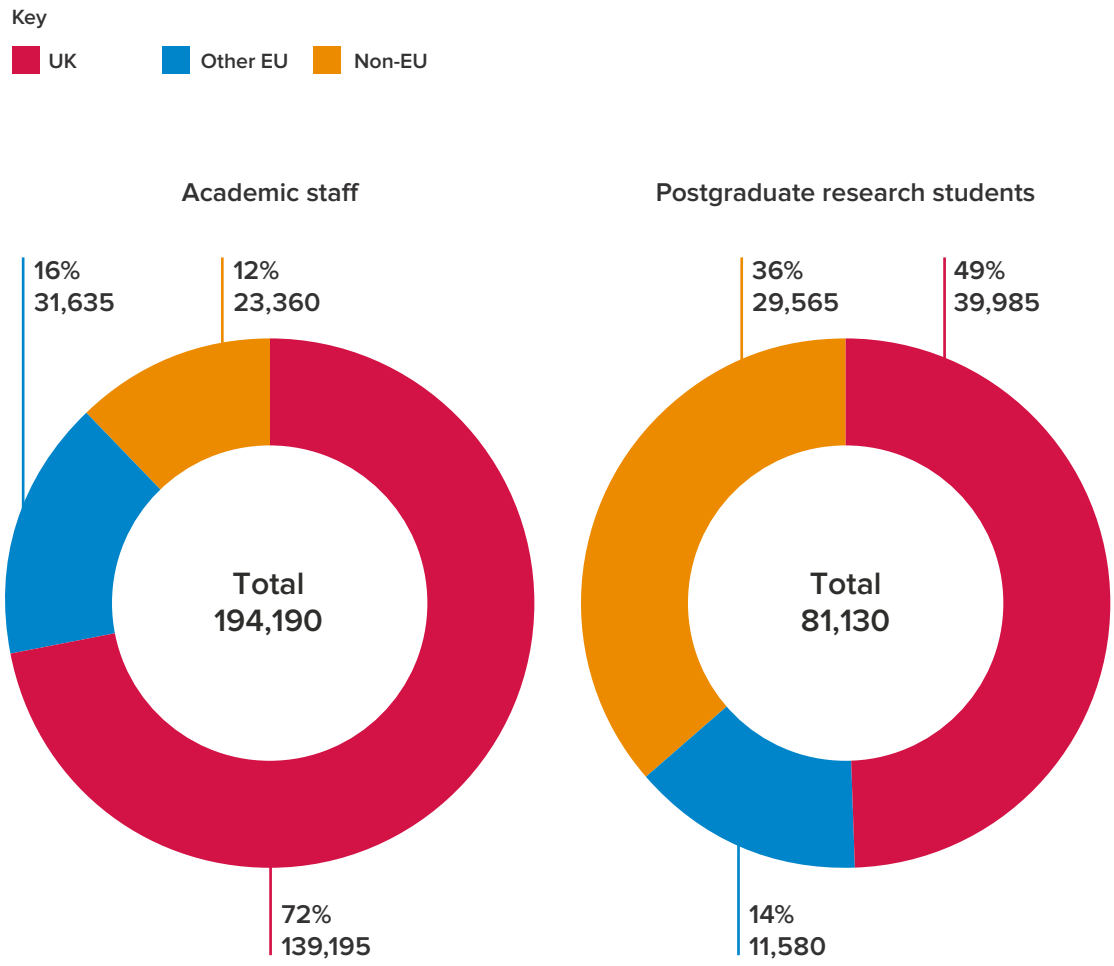
How international is the UK research workforce?

Over a quarter (28%) of the 194,190 academic staff in UK universities are non-UK nationals[15] (Figure 1). Recruitment from the EU makes up a significant part of this. In 2014/15 there were 31,635 EU nationals (excluding UK nationals) working in UK universities, 16% of the total, and 23,360 from outside of the EU, 12% of the total.

PhD students also make up a large proportion of the UK's research population, with a total of 81,130 active in UK higher education institutes in 2014/15[16]. 14% of PhD students are non-UK nationals from the EU and 36% are from outside the EU – half of the doctoral students in the UK are foreign nationals.

FIGURE 1

International make up of the UK university research workforce.



Source: Higher Education Statistics Agency (see https://www.hesa.ac.uk/stats, accessed 22 March 2016).

The international profile of the UK's academic workforce reflects the ability of the UK to attract talent from overseas and this supports the UK's scientific excellence. UK institutions with greater proportions of foreign researchers and researchers with international experience scored more highly in the recent Research Excellence Framework[17], which assesses the quality of research in higher education institutions.

How much do UK-based researchers move overseas?

Throughout this report, the term 'UK-based researchers' refers to researchers who have stated an affiliation with a UK institution. By analysing the publication record of such researchers we can see how much these individuals have moved internationally. Using data from publications in this way means that non-UK nationals who are based in the UK are included in the analyses and, as shown in Figure 1, these individuals represent a considerable proportion of the total.

The UK has a highly mobile researcher population. Almost 70% of active UK researchers[18] in the period 1996 – 2011 had published articles for which they were affiliated with non-UK institutions[19], indicating that they had worked abroad at some point during that period. Some of those researchers may have moved for relatively short periods, but UK-based researchers also move for longer periods: 21% of UK-based researchers worked abroad for a period of two years or more during the same period[20].

Comparing this to other scientific nations, only Switzerland has more internationally mobile researchers in its workforce, with 84% having worked outside Switzerland between 1996 and 2011, and 25% having worked overseas for a period of more than two years[21]. By contrast, 60% of Japanese and 71% of Chinese researchers did not publish a paper affiliated with an overseas institution during this period[22].

How much do UK-based researchers collaborate internationally?

An increasing proportion of UK research is published with partners across the world, and EU partners are involved in an increasing share of this work.

In 1981, about 90% of research papers by UK-based authors included only UK-based authors, whereas by 2011, over half of the UK's research output was the result of an international collaboration (Figure 2)[23]. This proportion has been rising steadily. In 2015, UK-based researchers published over three times as many papers as they did in 1981. The number of papers with only UK-based authors increased from 29,017 to 47,308, the number of internationally co-authored papers increased from 3,632 to 67,707.

Who do UK-based researchers collaborate with?

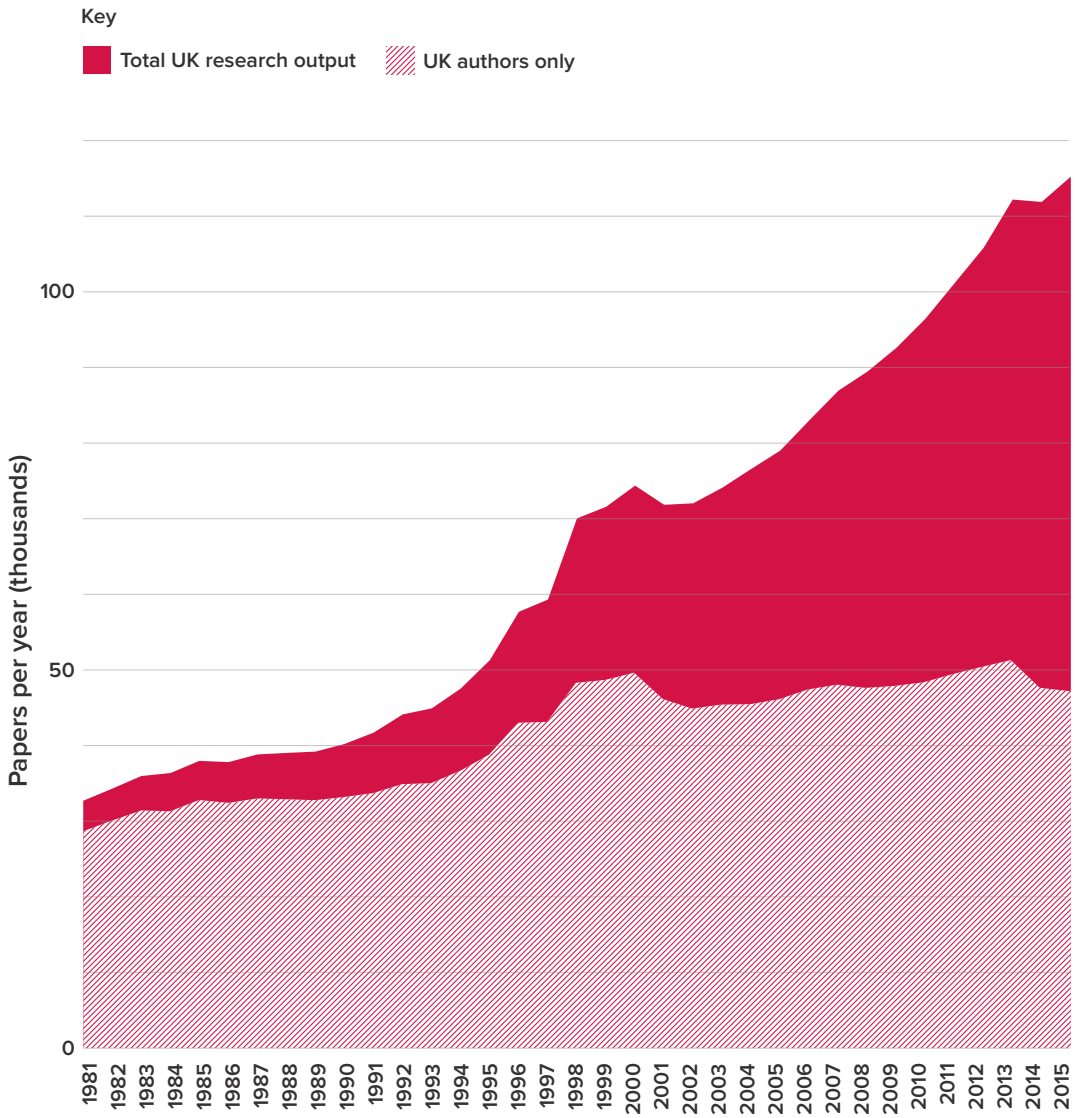
37% of the 1.6 million research papers published by UK authors from 2005 to 2014 were internationally co-authored[25]. The US is the UK's top collaborative research partner (Table 1A); of all the research published by UK researchers in this period, 12% was with a US co-author. However, the USA's total research output is much greater than that of the other countries listed in Table 1A. To account for this fact, we applied Salton's cosine, a method that can be applied to normalise the data by the volume of output for both partners, giving a size-independent indicator of the strength of collaboration. Once this is applied, the strength of collaboration[26] between the UK and Germany is shown to be greater than that between the UK and the USA (Table 1B and figure 3).

It was not possible to compare the UK's collaboration with the USA and Europe as a whole, but Table 1B shows that many European countries are among the UK's top collaborators, accounting for seven of the top ten positions.

Almost 70% of active UK researchers in the period 1996 – 2011 had published articles for which they were affiliated with non-UK institutions , indicating that they had worked abroad at some point during that period.

FIGURE 2

International collaboration of UK-based researchers 1981 – 2015[24].



Source: Adams J 2013 *The fourth age of research*. Nature, 497, 557-560.

TABLE 1

Top 20 collaborative partner countries for UK authors, 2005 – 2014. Note: individual publications may be counted in more than one row, where there are multiple co-authors.

EU Member States EEA and Switzerland

A Top collaborative partners in absolute terms

Country	Number of papers co-authored with UK-based authors	Percentage of the UK's total output accounted for by collaboration with country (%)	Percentage of the country's total output involving collaboration with UK-based authors (%)
USA	185,630	11.8	3.2
GERMANY	92,214	5.9	7.0
FRANCE	67,208	4.3	7.5
ITALY	58,664	3.7	7.5
NETHERLANDS	51,970	3.3	11.4
AUSTRALIA	50,963	3.2	8.4
SPAIN	46,499	3.0	7.4
CANADA	46,374	3.0	5.6
SWITZERLAND	34,618	2.2	10.8
CHINA	33,746	2.2	1.6
SWEDEN	30,086	1.9	10.7
BELGIUM	26,405	1.7	10.7
JAPAN	23,557	1.5	2.1
DENMARK	20,565	1.3	11.9
IRELAND	16,655	1.1	16.1
AUSTRIA	14,876	1.0	8.4
NORWAY	14,759	1.0	11.2
FINLAND	13,778	0.9	9.8
POLAND	13,690	0.9	5.2
RUSSIA	13,092	0.8	3.8

B Top collaborative partners when normalised to partner countries' total research output (Salton's cosine)

Country	Salton's Cosine	Number of papers co-authored with UK-based authors	Total papers published 2005 – 2014
GERMANY	0.064	92,214	1,316,041
USA	0.061	185,630	5,739,722
NETHERLANDS	0.061	51,970	456,556
FRANCE	0.057	67,208	891,855
ITALY	0.053	58,664	777,728
AUSTRALIA	0.052	50,963	606,766
SWITZERLAND	0.049	34,618	321,185
SPAIN	0.047	46,499	631,944
SWEDEN	0.045	30,086	281,954
BELGIUM	0.042	26,405	246,598
IRELAND	0.041	16,655	103,495
CANADA	0.041	46,374	831,193
DENMARK	0.039	20,565	173,077
NORWAY	0.032	14,759	131,386
GREECE	0.030	14,754	154,343
FINLAND	0.029	13,778	140,809
NEW ZEALAND	0.028	11,379	102,143
AUSTRIA	0.028	14,876	176,531
SOUTH AFRICA	0.028	11,475	110,202
PORTUGAL	0.025	11,896	141,696

Data & Analysis: Thomson Reuters, with some additional analyses by The Royal Society. Thomson Reuters should be referenced by any third party if quoting or referencing these data.

FIGURE 3

Strength of collaboration between UK-based and overseas authors within Europe – darker shading indicates greater strength of collaboration. Strength of collaboration has been normalised for total research output, using Salton's cosine.

Data & Analysis: Thomson Reuters, with some additional analyses by The Royal Society. Thomson Reuters should be referenced by any third party if quoting or referencing these data.


Finland
0.029
Sweden
0.045
Estonia
0.012
Latvia
0.004
Poland
0.021
Lithuania
0.007
Ukraine
0.009
Czech Republic
0.019
Slovakia
0.010
Hungary
0.019
Moldova
0.001
Austria
0.028
Slovenia
0.011
Serbia &
Montenegro
0.001
Croatia
0.01
Romania
0.009
Bosnia &
Herzogovinia
0.001
Bulgaria
0.010
Montenegro
0.002
Macedonia
0.002
Albania
0.001
Greece
0.030
Turkey
0.010
Cyprus
0.013
Israel
0.016

Would international collaboration be affected if the UK left the EU?

More than half of the UK's collaborative papers are now with EU partners.

Although EU membership supports international collaboration both directly and indirectly, much international collaboration proceeds outside the EU, and EU membership does not necessarily play a role in all collaborations between EU countries.

We have seen that UK-based researchers collaborate with partners all over the world. The proportion of the UK's internationally collaborative work that is authored with EU partners has been steadily increasing over time (Figure 4)[27].

The EU supports international research collaboration – within the EU and between EU researchers and those in the rest of the world – through various mechanisms. Several of the EU's research funding schemes aim to support collaboration, and although EU funding does not lead to greater levels of international collaboration than funding from other sources, collaborative work that is funded by the EU has greater impact (Table 4)[28]. The EU also supports collaboration in research facilities, and by playing a coordinating role in collaborations.

UK-based researchers would still be able to collaborate internationally if the UK were to leave the EU, and to access non-EU sources of support to do so. However, it is not possible to say which parts, if any, of the EU's support for collaboration they might continue to be able to access.

There are a number of countries that are not members of the EU, but can take part in EU research programmes, collaborate as part of consortia, and have access to European infrastructure. These countries have 'Associated Country' or 'Third Country' status, and they include Norway, Israel and Switzerland. You can find more information about these countries and the arrangements they have with the EU in the Society's report on the role of the EU in funding UK research[29].

If the UK were to have Associated Country status with respect to EU research funding, UK-based researchers could have access to some of the schemes that support international collaboration, but the UK would need to make an appropriate financial contribution to that particular scheme while no longer being able to contribute to its design.

How much do UK-based researchers collaborate with EU partners?

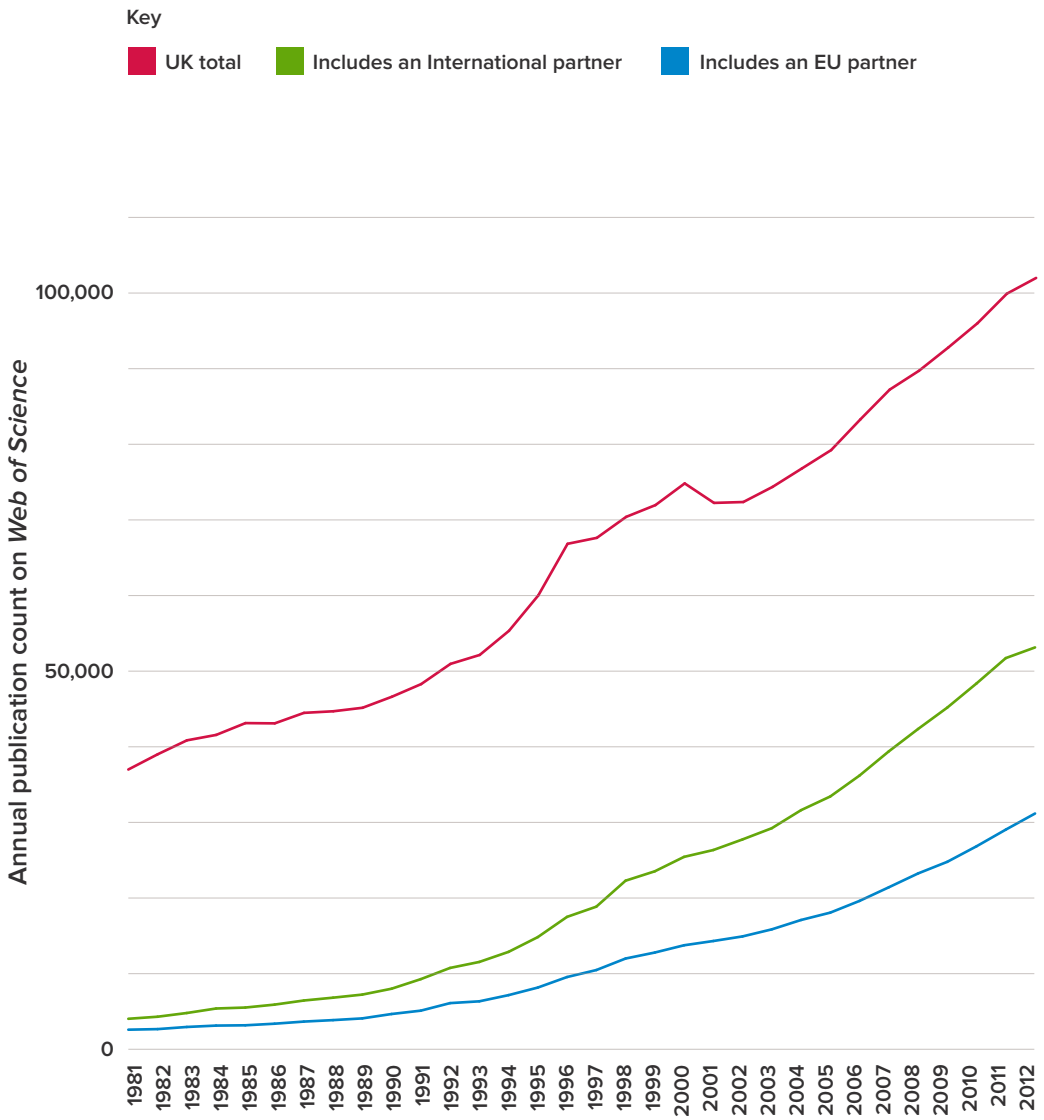
Although international collaboration has increased across the board, the UK's collaboration with EU Member States has increased at a faster rate than with other partners. The US continues to be the UK's single most frequent partner country, but its dominance has declined. More than half of the UK's collaborative papers are now with EU partners. In 1981, 43% of the UK's international output comprised UK-Europe collaborative papers; in 2012 it was 60% (Figure 4)[30].

Germany and France, in particular, became increasingly frequent partners after 1990 and this growth accelerated after 2000. Most of these papers have been bilateral, but about 30% of publications with France or Germany also have a co-author from the USA[32]. Some UK papers include several co-authors that may come from both EU and non-EU countries, such as the US, Canada or India. Approximately one third of UK papers that have a non-EU co-author also have an EU co-author (Figure 5).

These analyses suggest that collaboration with researchers in EU member states is important for UK research, but does not indicate whether these collaborations rely on the UK's membership of the EU.

FIGURE 4

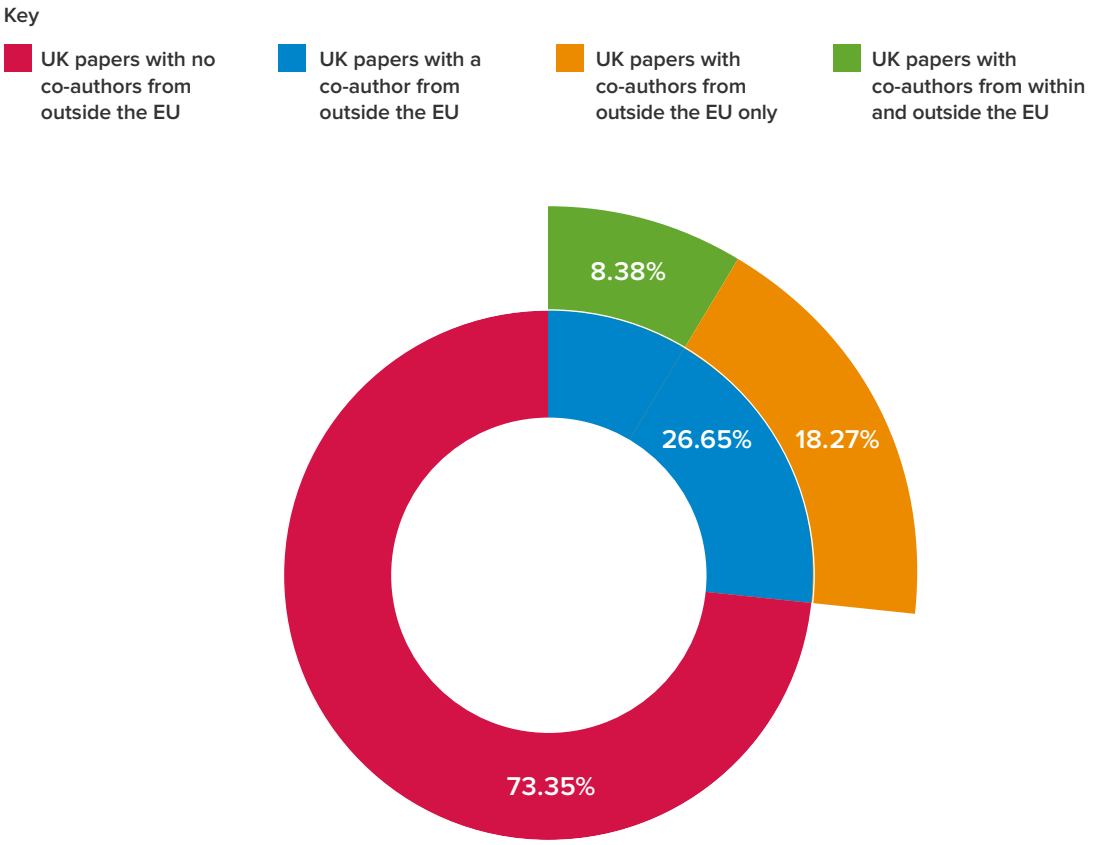
Increase in UK-based researchers international collaboration, and share accounted for by collaboration with EU partners, between 1981 and 2012[31].



Source: Data from Thomson Reuters Web of Science, analysed by Digital Science.

FIGURE 5

Proportion of the UK's internationally co-authored papers that had a non-EU co-author and an EU co-author, 2005 – 2014[33].



Source: Data & Analysis: Thomson Reuters, with some additional analyses by The Royal Society. Thomson Reuters should be referenced by any third party if quoting or referencing these data.

How does the EU support collaboration?

The EU has a stated aim to improve the effectiveness of national research systems, transnational co-operation and competition through the creation of the European Research Area (ERA). It aims to foster an open labour market for researchers and optimise circulation, access to and transfer of scientific knowledge. The Society's report on the role of the EU in funding UK research[34] includes further information on the ERA.

International collaboration is supported and facilitated by a wide variety of mechanisms and schemes. These exist at the national and international level, and various organisations are involved in funding and administering these schemes, from governments to charities, working alone or collaboratively themselves. Within this context, the section summarises the ways in which the EU supports collaboration, by funding collaborative research projects, investing in infrastructure, providing networks and coordination, and harmonising research systems across Europe.

Supporting collaboration through funding

The EU funds collaboration through several interlinked programmes. Further details of EU funding for most of the schemes discussed here can be found in the Society's report on the role of the EU in funding UK research[35]. Framework Programmes (FPs) are the main EU funding mechanism for research, development and innovation.

Horizon 2020

Horizon 2020 is the current Framework Programme, with a budget of €74.8 billion for 2014–2020. Most Horizon 2020 funding is only available to consortia of organisations from three or more countries, one of which must be an EU Member State[36]. Horizon 2020 also funds the Marie Skłodowska-Curie Actions to support mobility (see page 29).

The European Research Council (ERC) will award 17% of the total Horizon 2020 budget. ERC funding is awarded solely on the basis of excellence and does not require collaboration[37], and the vast majority of funding goes to individual scientists, although consortia can apply[38]. Nonetheless, 57% of papers funded by the ERC do include international collaboration. This compares to 53% of papers funded by the Wellcome Trust.

Societal Challenges and **Research and Innovation Actions** fund research projects tackling challenges in areas such as health, energy and transport[39]. There are also more-specific **Innovation Actions**, which focus funding on closer-to-the-market activities if they aim at producing new or improved products or services[40]. Applications for this funding require that a consortium is formed, representing at least three countries, one of which must be a Member State. The budget for this part of Horizon 2020 is €31.7 billion[41].

The ERC will award 17% of the total Horizon 2020 budget. 57% of papers funded by the ERC include international collaboration.

Supporting collaboration through shared infrastructure and joint projects

There are many shared research facilities within Europe, and these are part of the landscape for collaboration within the EU. While most of the cost of shared research facilities is borne by participating countries, the EU often provides funding for activities such as planning, strategic coordination, networking and transnational access. The Society's report on the role of the EU in funding UK research[42] includes details of EU funding for international facilities and major equipment. Beyond funding, the EU plays an active role through a number of routes, to facilitate collaboration through shared research infrastructure.

Coordinating decision making on research infrastructure

The EU has established the **European Strategic Forum on Research Infrastructures (ESFRI)** as a forum to support coherent and strategic decisions regarding planning and implementation of research infrastructures in Europe. The ESFRI Roadmap 2016[43] identifies the new research infrastructures of pan-European interest[44], and a growing number of countries have prepared national roadmaps that use the ESFRI Roadmap as a reference[45].

The EU has also established the **European Research Infrastructure Consortium (ERIC)** to make it easier to establish and operate large European research infrastructure among several Member States and associated countries[46], removing the need for the repetition of negotiations between countries.

Supporting pan-European research facilities

Pan-European research facilities are not EU initiatives, but may receive EU support. Researchers from the participating countries that fund the facilities are eligible to use them, and researchers from other countries may also be able to access them under certain conditions.

The UK hosts the headquarters of 6 pan-European research facilities, with facilities distributed across multiple participating countries within the EU and beyond. Table 2 shows which of these facilities were supported by significant EU funding to help them become established, as well as the breadth of collaborations they support.

TABLE 2

UK-headquartered pan-European research infrastructure.

UK-based pan-European research facility	Early funding from the EU	ERIC	Total participating countries	Non-EU Member countries
High Power Laser Energy research Facility (HiPER)	Yes[47]	No	10[48]	1
ELIXIR (European Life-science Infrastructure for Biological Information)	Yes[49]	No	16[50]	3
Integrated Structural Biology Infrastructure (INSTRUCT)	Yes[51]	No[52]	12[53]	1
Infrastructure for Systems Biology-Europe (ISBE)	Yes[54]	No	13[55]	1
Square Kilometre Array (SKA)	No[56]	0	10[57]	6
European Social Survey (ESS ERIC)	No[58]	Yes	15[59]	1

Supporting access to national research facilities

The EU supports transnational and virtual access, networking, and joint research activities in national research facilities. These create opportunities for new and existing groups of researchers and scientists to collaborate across disciplines and countries. Users can be researchers from academia, business, industry and the public sector from countries participating in the programmes.

The EU supported 3,539 UK-based researchers to access 1,055 European research facilities between 2007 and 2013. In addition, 107 UK national research facilities received support from the EU to grant access to international researchers, fostering collaborations and exchange of ideas.

Supporting engagement with intergovernmental research efforts

The European research landscape includes several intergovernmental organisations – in which two or more nations work together – providing valuable facilities and infrastructures. Each of these organisations has its own institutional arrangements and membership rules, and the EU plays a different role in each. Some, such as the ITER fusion experiment, are directly managed by the EU in concert with other countries. Others, such as CERN, predate the EU itself and receive only a marginal part of their budget from the EU.

Within the ERA, there are also **Joint Programming Initiatives**[60], which are research partnerships that aim to pool national research efforts across Europe and tackle common challenges more effectively in a few key areas. Participation of Member States is voluntary, so partnerships comprise variable groups of countries. The European Commission facilitates the Joint Programming process and supports Member States in a number of ways[61], including by launching complementary measures, and linking them to international actions and bodies.

Supporting collaboration with countries outside of the EU

As well as supporting collaboration within the EU, the EU has international agreements for scientific and technological cooperation with 20 other countries[62]. These create a framework for participation in joint projects, sharing of facilities, staff exchanges or the organisation of specific events. Industrialised and BRIC countries[63] are usually required to fund their institutions' participation.

The EU is developing targeted strategies with selected countries[64]. The Commission has published 11 multi-annual roadmaps for scientific cooperation with industrialised countries (Canada, South Korea, USA, Japan); emerging scientific powers (Brazil, Russia, India, China, South Africa); and the European Neighbourhood Policy countries in two groups (Eastern Partnership and Southern Mediterranean). Each roadmap presents the state of cooperation with the EU, and defines thematic priorities for future cooperation in research and innovation activities[65].

The EU supported 3,539 UK-based researchers to access 1,055 European research facilities between 2007 and 2013.

UK papers acknowledging any type of EU funding have more impact than the average paper.

Is EU funding associated with more, or higher impact, internationally collaborative research?

It is difficult to assess the impact of the various mechanisms through which the EU sets out to support collaboration, but it is possible to compare EU-funded work with that funded from other sources. Box 3 also considers whether joining the EU increases collaboration.

By comparing research funded by a range of UK national funders with work funded by the EU, and looking at the proportion that was internationally co-authored for each funder, we can see that papers acknowledging any EU funding are not associated with higher rates of international co-authorship compared with those acknowledging national funders, but both support a considerable amount of internationally collaborative work. However certain streams of EU funding, specifically ERC funding, do show a higher rate of international collaboration.

50% of papers acknowledging an EU source of funds involve authors from two or more different countries compared to 49% of those acknowledging a major UK research funder (Table 3). Looking specifically at those acknowledging ERC funding, which is not targeted at collaboration, international co-authorship is actually higher at 58%. This is higher than most of the UK Research Councils, which also do not require international collaboration.

TABLE 3

Source of funding and level of international collaboration. Percentage of research funded by each organisations that was internationally co-authored, between 2005 and 2014[66].

Funding Organisation	Percentage of Internationally Co-Authored papers (%)
All EU sources (including ERC)	50
ERC	58
The Wellcome Trust	54
AHRC	36
BBSRC	44
EPSRC	42
ESRC	35
MRC	47
NERC	57
STFC	74
National funders average	49

Internationally collaborative papers have greater impact than domestic papers. For both papers published by UK-only authors and UK-EU co-authored papers, those acknowledging any type of EU funding have more impact than the average paper, and where that funding came from the ERC in particular, papers have the highest impact of all (Table 4). This may reflect the excellence of applications to and research funded by the ERC.

TABLE 4

Impact of UK-based researchers' papers, whether or not they are collaborating with partners in the EU and receiving European research funding (2005 – 2014)[67].

Authors	Funding source	Normalised Citation Impact[68]	Percentage of Highly Cited Papers
UK only	Any	1.36	13%
UK only	EU	2.07	26%
UK only	ERC	2.80	34%
UK and EU	Any	1.98	21%
UK and EU	EU	2.27	29%
UK and EU	ERC	3.17	37%

BOX 3 Does joining the EU increase international collaboration?

Research has shown that there is a marked increase in cross-border collaboration within Europe when countries join the EU[69]. Although not necessarily a causal link, this increase starts even before nations receive full membership, perhaps spurred by access to EU research funds as Associate Members. The most significant increase in co-publishing is between new EU Member States when they join the EU. There is also an increase in collaboration between new Member States and older Members States when the new Member joins, but not to such a great extent. It is not possible to draw conclusions from this about likely consequences for collaboration of leaving the EU.

Would researcher mobility be affected if the UK left the EU?

7.6% of UK-affiliated researchers (including non-UK nationals) worked for more than two years in other EU countries but not outside the EU between 1996 and 2011.

EU membership supports the movement of researchers both directly and indirectly, actively supporting movement through Marie Skłodowska-Curie Actions and facilitating it by allowing free movement of workers. However, the global nature of research sees scientists moving to and from the UK from all over the world.

The right to freedom of movement within the EU allows researchers who are EU nationals to work wherever they choose within the EU. However, UK-based researchers move to countries outside the EU as well as to those within, and the UK research workforce is comprised of researchers from all over the world, not just from the EU. It is not clear whether the UK's membership of the EU helps UK institutions to attract these non-EU workers, but they do successfully access EU funding when they are here.

Without detail, it is not possible to speculate how this mobility might be affected by changes to freedom of movement, but this section includes details of the visa regulations with which researchers have to comply to enter other countries, to illustrate how restrictions on movement operate in practice.

Visa restrictions are not the only factor in researchers' decision to move. Other factors such as culture, and geography also play a role.

How much do UK-based researchers move within the EU?

UK-based researchers move to work within the EU, but they also move globally, and do so more than researchers from comparable countries. Looking at publications data for active researchers affiliated with a UK institution, we used institutional affiliations on research papers to see where researchers had worked between 1996 and 2011. 7.6% of UK-affiliated researchers (including non-UK nationals) had experience of working abroad for more than two years in other EU countries but not outside the EU, which is similar to the proportion of researchers in both Germany and France that had done so, at 8.7% and 7.0%, respectively.

The proportion of UK-affiliated researchers who worked in a country outside the EU for more than two years over the same period was 13.3%[70], whereas the proportions of researchers from Germany and France who had done so were lower, at 9.2% and 8.1% respectively.

Table 5 shows the proportion of researchers in European countries that spent more than two years working in a different country between 1996 and 2011[71]. The UK is ranked sixth, but note that all the countries ranked above the UK are notably smaller—in terms of population, GDP and research spend—so it might be reasonable to assume that researchers from those countries have more incentive to move abroad to develop their careers.

TABLE 5

European countries ranked by the proportion of their research population that has spent more than two years working in a different country between 1996 and 2011[72].

European Member States EEA countries and Switzerland

Country	Proportion of researchers who have worked abroad (%)	Proportion of researchers who have worked in countries outside the EU (%)	Proportion of researchers who have worked in countries inside the EU and not outside the EU (%)
SWITZERLAND	24.6	9.2	15.5
LIECHTENSTEIN	23.2	2.8	20.4
CYPRUS	23.2	8.4	14.8
IRELAND	22.3	10.2	12.2
LUXEMBOURG	21.9	2.3	19.6
UNITED KINGDOM	20.9	13.3	7.6
ICELAND	18.3	6.5	11.8
GERMANY	17.8	9.2	8.7
SWEDEN	17.7	8.8	8.9
AUSTRIA	17.3	5.8	11.5
NETHERLANDS	15.8	6.6	9.2
BELGIUM	15.8	6.2	9.5
DENMARK	15.5	6.5	9.0
MALTA	15.4	4.8	10.6
FRANCE	15.1	8.1	7.0

This data includes active researchers who have migrated to another country (or countries) for at least 2 years. Although some researchers may have spent more than two years in both an EU and a non-EU country, such researchers are only counted as having worked outside the EU, due to the way in which this data was produced.

FIGURE 6

International mobility of Europe's researcher population. Darker shading indicates countries in which more researchers had spent a period of two years or more working abroad between 1996 and 2011[73].

Data from: Science Europe and Elsevier 2013, Comparative Benchmarking of European and US Research Collaboration and Researcher Mobility (see http://www.scienceeurope.org/uploads/PublicDocumentsAndSpeeches/SE_and_Elsevier_Report_Final.pdf


Finland
12.7%
Sweden
17.71%
Estonia
10.6%
Latvia
8.6%
Poland
8.1%
Lithuania
7.3%
Czech Republic
8.4%
Slovakia
11.2%
Hungary
13.9%
Moldova
21%
Austria
17.3%
Slovenia
6.3%
Croatia
5.6%
Serbia
20.6%
Romania
9.2%
Bosnia &
Herzogovinia
7.3%
Bulgaria
13.6%
Montenegro
18.9%
Macedonia
5.7%
Albania
7.5%
Malta
15.4%
Greece
13.2%
Turkey
6%
Cyprus
23.2%
Israel
18.2%

Researchers who are EU nationals are able to travel, live, look for a job and work in any Member State without a visa or work permit, due to the EU's free movement of workers principle.

How does the EU support researcher mobility?

The EU sets out to support the mobility of researchers within the EU. The European Research Area is intended to be "a unified research area open to the world based on the Internal Market, in which researchers, scientific knowledge and technology circulate freely and through which the Union and its Member States strengthen their scientific and technological bases, their competitiveness and their capacity to collectively address grand challenges"[74]. This broad aim has driven measures to support the movement of researchers, both indirectly by removing restrictions on their movement and directly through schemes designed to support mobility. These measures apply to both EU nationals and non-EU nationals (see Box 4).

International mobility is supported by national and international schemes, and individual countries set their own immigration rules and regulations, which researchers have to comply with. As well as their visa regulations, many factors influence researchers' decisions about where to move and employers' decisions about where to recruit from.

Freedom of movement of workers within the EU

Researchers who are EU nationals are able to travel, live, look for a job and work in any Member State without a visa or work permit[78], due to the EU's free movement of workers principle[79]. This right also extends to the European Economic Area (EEA) and Switzerland. For UK research institutions, this means that the pool of 'home' talent from which they can recruit without having to go through the immigration system is much bigger. Compared with the administrative burden and cost of moving to and from non-EU countries, mobility within the EEA is relatively cheap and easy.

British researchers wishing to travel to countries outside the EEA and Switzerland are subject to the immigration systems of the destination country, and non-EU researchers moving to the UK must comply with immigration rules that are predominantly under the control of the UK government[80].

Box 5 includes examples of the immigration rules and regulations that researchers have to comply with when moving outside of the EU, to the USA, Australia, China, India and Turkey. It also includes examples of the requirements for moving to countries within the EU, the UK and Germany, for researchers that do not have the right to free movement within the EEA.

Together, these examples show the variety of immigration systems around the world, and the cost, bureaucracy and time it takes for researchers to comply with visa requirements when they move.

Travel visa restrictions are one of the factors that influence researchers' decisions about where to move[81] so it is possible that a change

BOX 4 Movement of non-EU nationals within the EU

The EU is working to harmonise mobility rules for researchers and students from outside the EU (non-EU citizens), through a draft Directive that is currently progressing through the European Parliament and Council[75].

The Directive's stated objective is to advance the European Union in the global competition for talent and to promote Europe as a world centre of excellence for studies and training. It aims to do this by making it easier for third-country researchers to make short and long visits to other Member States for their work, allowing dependents to join them in the EU and allowing them to remain in the EU for up to nine months after they have completed their study or work, to look for a job or set up a business.

The UK, Ireland and Denmark are not taking part in this, so the changes will not take effect in the UK. This Directive is discussed here to illustrate a further way in which the EU is working to support intra-EU mobility for researchers.

to the principle of free movement could influence the attractiveness of the UK to other EU researchers and the willingness of British researchers to move around the EU. However since many factors influence these decisions, it is not possible to say the extent to which patterns of mobility might change.

Should the UK leave the EU, the nature of the UK's future relationship with the EU will determine free movement rights[84]. EEA member countries have different agreements underpinning free movement within the EEA, for example Norway retains the right to free movement and Norwegian researchers can access European research funding. In a referendum in Switzerland, Swiss citizens voted

BOX 5 For a researcher with a PhD emigrating or travelling for work[82]

UK	
Work	There are two possible routes: **Tier 1 (Exceptional Talent)**, for established or future leaders in academia or industry and **Tier 2**, for skilled workers with at least a graduate-level job offer. A **Tier 1** visa will cost £900 and a **Tier 2** visa may cost from £400 to £1200. Applicants for either visa must also pay an annual £200 healthcare surcharge. Both visas offer five years residency and it is possible to apply for Indefinite Leave to Remain after this period. Holders of either visa can be accompanied by dependents who also have the right to work and access healthcare. Both **Tier 1** and **Tier 2** visas are normally processed within 10 days.
Business and research trips	A short-stay visitor to the UK needs a **Standard Visitor** visa, which is valid for 6 months and typically processed within five days, for a cost of £87. Paid engagements require a **Permitted Paid Engagement** visa, which is valid for one month paid engagement and also costs £87.
USA	
Work	There are two temporary **employment visas** for professionals in specialty occupations. The **H-1B** is for those with a job offer that requires a bachelor's or higher degree. The **O-1B** is for those who have risen to the top of their field of endeavour and it must be petitioned by a US organisation. In both cases, dependents can apply for a dependent's visas, but cannot work. The processing time for both visas is around 2 – 5 months, and they can cost anywhere from $825 – $4,000 USD. Applications for **permanent residency** are two tier, must be accompanied by an offer of employment and fall into a broad range of categories depending on the credentials of the person applying. For the initial **I-140** application, applicants can apply through one of the following streams; **EB-1 extraordinary ability**, **EB-1 outstanding professors and researchers**, **EB-2 advanced degree**, **EB-2 exceptional ability**, **EB-2 national interest waiver**, **EB-3 skilled workers** and **EB-3 professionals**, which each take around 4 – 8 months to process and cost $580 USD. For any of the **EB-2** or **EB-3** streams, the employer must also complete a **PERM** application with the Department of Labor. A **PERM** requires the sponsoring employer to prove that there are no minimally qualified US workers for the position; this is usually done via a job advertisement in a newspaper and can take around 6 – 10 months. Once one of these statuses is achieved, the individual can complete the second part of the permanent residency application, **I-485**, which costs over $1,000 USD. Once in possession of permanent residency status, an individual can apply for permanent residency for any dependents.
Business and research trips	For business activities, a foreign national can obtain a **B-1** business visa that is valid for up to 6 months and costs $160 USD. They cannot partake in paid work and must demonstrate ties to their home country. Alternatively, the **Visa Waiver Program** allows nationals of certain countries to enter the US for business without a visa. Authorisation is usually immediate and costs $14 USD.
CHINA	
Work	There is no specialised pathway for individuals possessing a bachelors or higher degree. The work visa system is split into two tiers; **China Work 'Z' Visa** and **China Talent 'R' Visa**. **China Work 'Z'** visas are granted to those who plan to take on scientific or technical work, project management or consultation for a cooperating party in China. The **China Talent 'R' Visa** is issued for much needed, highly talented people who need to remain in China. Both the **Work 'Z'** and **Talent 'R'** visas are valid for up to 30 days from arrival, during which time the visa holder must seek a temporary residents permit, which is valid for up to 5 years. The USA and China have recently made a special agreement under which US nationals visas can be valid for up to 10 years[83]. Both visas cost around $1,000 USD and dependent family members can accompany an individual under these streams. A permanent residence card is an option for an eligible spouse of a Chinese national, dependent, investor or special personnel.
Business and research trips	For exchanges, visits and tours an individual can obtain an **'F' visa**, which is valid for 12 months, takes four working days to process and costs less than $348 USD. If travelling for trade and commercial reasons, it is necessary to obtain a **Business 'B' visa**, which is usually issued for 60 days per visit.

INDIA	
Work	There are no separate authorisation pathways for individuals with specialised knowledge. Instead, one **'E' visa** covers a range of professions including skilled, technical personnel and senior managers. This visa can be granted for up to one year and costs around $1,000 USD. It takes around 6 – 34 days from the date of application and permits dependents to accompany the visa holder. There is no form of employment-based permanent residence in India.
Business and research trips	A **Business 'B' visa** is used for business visits and allows multiple entries. It is valid for up to one year and takes 3 – 4 working days to process, costing around $ 348 USD.
AUSTRALIA	
Work	There is no specialised pathway for individuals possessing a bachelors or higher degree, instead the visa system is split into two pathways: **Subclass 400**, for those doing short-term specialised work, and **Subclass 457**, for temporary sponsorship of overseas skilled workers. **Subclass 400** is normally valid for 3 months, but can be extended to 6 months when there is a strong business case and **Subclass 457** is valid for up to 4 years. These visas cost $165 AUD and $420 AUD, respectively. An employer can nominate a foreign national for a full-time position in their organisation using the **Employer Nomination Scheme** (ENS) **Subclass 186** visa or **Migration Scheme** (RSMS) **Subclass 187** visa. Dependents can accompany individuals with either **Subclass 186** or **Subclass 187** status.
Business and research trips	The **Subclass 400** visa can be used for short stays to carry out specialised work or to participate in non-ongoing activities at the invitation of an Australian organisation.
TURKEY	
Work	There are no separate authorisation pathways for individuals with specialised knowledge, instead a standard **Work Permit** is used for most assignments. A minimum salary and a local worker quota apply. This permit is valid for one year and takes around 88 days to process, costing around $1,000 USD. A permanent residence application was only introduced in 2014 and so far does not accept applications.
Business and research trips	Certain technical workers can obtain an **AMS Work visa**. The individual can work at the host company designated on the visa application. This is generally granted for a maximum of 90 days and allows multiple entries. Processing takes 2 – 5 calendar days to process and costs less than $1000 USD.
GERMANY	
Work (for a US citizen)	A scientist from the US can travel to Germany for work at a university or research institute using a **Guest Scientist** visa. All German visas cost €60 and it is recommended that individuals allow at least 3 weeks processing time. Applicants need: confirmation from a health insurance provider proving that they have cover for their whole stay in Germany, all flights and rail booked with proof, proof of accommodation for the whole stay in the Schengen area and a personal covering letter explaining the purpose of the stay in Germany. They must also provide a no-objection letter from their own university/research institute, an invitation letter from the university or institute they are visiting, proof of their academic qualification and proof of marital status. Once a Guest Scientists is in Germany, they can apply for a residence permit for work purposes, under the **Specialist Profession** stream. To gain a work permit, it is necessary to prove you have the ability to integrate into German society, sufficient funds to sustain yourself and a contract of employment. US, Australia, Canada, Israel, Japan, New Zealand, Switzerland and the Republic of Korea can apply for the work permit when in Germany as a tourist.
Business and research trips (for a US citizen)	For trips shorter than 90 days without work, no visa is required. For stays longer than 90 days, a US citizen can apply for a **Business Visa**, which requires copies of the previous 3 months' bank statements, an invitation letter from an organisation and a detailed list of business meetings for stays over 30 days.
Work (for a Chinese citizen)	Chinese citizens will need a tourist visa to visit the Schengen area for less than 90 days. However, the same requirements apply as for a US citizen if an individual wants to visit Germany as a visiting researcher using a **Guest Scientist visa**. They can also apply for a residence permit for work purposes using the **Specialist Profession** stream but they must apply before arriving in Germany.
Business and research trips (for a Chinese citizen	For trips under 90 days without work, a tourist visa is required. As with all visas this will cost €60 and take around 3 weeks to process. Again, for trips over 90 days, a Chinese citizen can apply for a **Business** visa.

to limit immigration, which led to limits being imposed on the principle of free movement. This affected the ability of researchers to move to Switzerland and could affect Switzerland's ability to access European research funding in future (see Box 6).

Supporting mobility through funding

The EU has specific funding schemes to support mobility. Many other national and international organisations support the international mobility of researchers. Box 7 describes some of these, as examples of the sources of support that exist beyond the EU.

Marie Skłodowska-Curie Actions (MSCAs) enable researchers to work in different countries, sectors or disciplines. MSCAs support international training networks for PhD and early career researchers, international mobility fellowships for experienced researchers, international exchanges of research staff and other programmes related to international and intersectoral research training and career development.

Between 2007 and 2014, 3,454 UK-based researchers received funding from the MSCAs, with a total value of over €1 billion. 1,297 received fellowships and 2,157 received funding for staff exchanges. Interestingly, the most popular destination for UK-based Fellows was to stay in the UK for their research. This reflects that many UK-based researchers are not UK nationals and qualify for the MSCA scheme to support a Fellowship in the UK if they have not resided here for more than 12 months in the 3 years prior to their application; over 400 chose this option. The next most-popular destinations were Germany and France, with around 100 fellows each.

Between 2007 and 2014, 3,454 UK-based researchers received funding from the Marie Skłodowska-Curie Actions, with a total value of over €1 billion.

BOX 6 What happened to Switzerland when they stopped free movement of people?

In February 2014, Swiss citizens voted in a referendum on immigration from any country, with the majority of people (50.3%) backing the limiting of immigration through quotas. Due to the referendum result, Switzerland was required to renegotiate its agreement covering migration with the EU. The set of bilateral agreements signed between the EU and Switzerland in 1999 had included agreements on both freedom of movement for people between Switzerland and the EU, and provisions for Switzerland's inclusion in EU research programmes as an Associated Country[85]. These agreements were linked by a so-called 'guillotine clause', meaning that if one of the agreements was terminated or altered, the other could also be affected. Subsequent changes to Swiss immigration policy would therefore potentially jeopardise Switzerland's future access to EU research funding.

When Switzerland chose not to sign a protocol on Croatia, which had recently joined the EU and was not already covered by the existing Swiss-EU agreement, the European Commission initially announced that Switzerland's status in Horizon 2020 would be downgraded from Associated to Third Country, meaning Swiss researchers were excluded from Erasmus programmes and many sources of H2020 funding[86].

In December 2014, Switzerland and the EU signed an agreement giving Switzerland Partial Associated status up to the end of 2016[87]. This agreement allows Swiss researchers to directly access Horizon 2020 funding as an Associated Country for particular activities, including ERC funding and Marie Skłodowska-Curie Actions. For certain other parts of the Horizon 2020 programme, Switzerland remains a non-associated Third Country participant, under which arrangement they may have to provide some matched funding in order for their researchers to receive EU funding.

Switzerland's status in Horizon 2020 after 2016 will be dependent on whether it applies the rules on the free movement of people across the whole EU and confirms this agreement will extend to Croatia. If it does this, it will regain its full Associated Country status, however if it chooses not to do this, it will only be able to participate as a third country.[88]

BOX 7 National and international funding for mobility

The Newton Fund[90] was established by the UK Government to promote international economic development though science and innovation partnerships. The fund facilitates bilateral exchanges of researchers between the UK and partner countries. The UK Government has selected 15 partner countries, including Brazil, China, Egypt, Turkey and the Philippines.

The Newton Fund will distribute £735 million between 2014 until 2021 and is part of the UK's Official Development Assistance. The fund is operated through 15 UK partner delivery organisations, including The Royal Society, which manage the funds and run calls focusing on three strategic areas: people, research and translation.

The UK Research Councils[91] run a number of schemes to support activities that foster international collaboration. These include establishing partnership links between research institutions, building on existing links between research groups and extending networks, and encouraging researchers from overseas to undertake research in the UK as well as UK researchers to spend time abroad. The Research Councils offer a number of opportunities depending on the type of collaboration being undertaken.

The Global Innovation Initiative[92] is a partnership between the UK Department of Business Innovation and Skills and the US Department of State, administered by the British Council and the US Institute of International Education. The GII encourages multilateral research collaborations between universities in the UK, the US and designated third countries, currently Brazil, China, India and Indonesia. Grants are intended for projects focusing on science, technology, engineering and mathematics (STEM)-related global challenges. The initiative aims to increase global mobility and develop a research workforce with an international outlook.

An OECD study using authors' institutional affiliations to track mobility found that scientists are more likely to move between countries which are geographically closer, socioeconomically similar and have comparable scientific cultures.

Of foreign fellows coming to the UK, over 700 came from Italy, 575 from Spain and 550 from Germany. Nearly 24% of MCSA awards in FP7 were for researchers from countries that are outside the EU Member States and its Associated Countries[89].

China was the most popular country for staff exchanges with the UK, with almost 800 staff coming to the UK and about 850 UK staff going to China. This figure dwarfs the number of staff coming from or going to other countries. Brazil, Russia and India, which were the next most popular exchange partners, each sending between 100 and 200 staff to the UK. The US, Brazil, Russia and India were the next most popular destinations for UK staff, receiving between 100 and 200 UK staff.

Does EU membership attract researchers to the UK?

Researchers' decisions to move for work are affected by a wide range of factors, both professional and personal. An OECD study using authors' institutional affiliations to track mobility found that scientists are more likely to move between countries which are geographically closer, socioeconomically similar and have comparable scientific cultures[93]. The study found that scientific collaboration appears to be a major factor associated with the mobility of scientists, but common language and distance between countries have a stronger impact on mobility. Scientists are more likely to move between countries who place similar importance and funding on R&D. Mobility is also related to policies such as travel visa restrictions and changing economic and research conditions.

With all of these factors playing a part, it is not possible to say whether being a member of the EU, and a part of the ERA, makes the UK a more attractive destination for researchers from outside the EU. However, EU funding is an important component of the overall research environment in the UK, as the Society's report on the role of the EU in funding UK research shows[94].

EU funding schemes are open to all researchers based in EU countries, regardless of their nationality. As an example of the extent to which non-EU nationals access European funding while based in European countries, we looked at the nationalities of the recipients of ERC Starter Grants, Consolidator Grants and Advanced Grants across a selection of European Member States and Associated Countries (Tables 6, 7 and 8), from 2009 to 2015.

These three Grants are flagship ERC schemes that fund individuals at particular stages in their research careers. For all three, some researchers move to countries with access to ERC funding specifically to receive these Grants. However, we cannot conclude that these are the primary driver of their movement. Foreign nationals who are already based in these countries also successfully access these funding streams.

The UK hosts a notably higher proportion of foreign nationals for ERC Starter Grants than comparable EU member states; 65% of recipients in the UK are foreign nationals, compared with 31% in France and 36% in Germany. 35% of the recipients of Consolidator Grants in the UK are foreign nationals and 26% of recipients of Advanced Grants are. For Advanced Grants, this proportion is roughly the same in France and Germany.

In Associated Countries, only Switzerland and Israel receive these ERC Grants in any notable number, and the nationality profiles of ERC Grant recipients vary markedly between Switzerland, Israel and Norway. Whereas in Switzerland recipients for all three Grants are predominantly foreign nationals, in Israel recipients are overwhelmingly Israeli researchers.

To draw stronger conclusions from these figures it would be important to understand the international make up of the research workforces in these different countries, but unfortunately comparable data was not available for this report.

TABLE 6

Recipients of ERC Starter Grants based in example European Member States and Associated Countries by nationality (2009 – 2015)[95].

Associated countries

	National of the host country (%)	National of any other European country, based in host country (%)	National of any non-European country, based in host country (%)	Any foreign national, moving to the country specifically for the Grant (%)	Total number of grants received
UK	35	39	19	7	565
FRANCE	69	19	7	5	344
GERMANY	64	16	10	9	405
SWITZERLAND	15	60	14	11	149
ISRAEL	96	2	0.5	0.5	175
NORWAY	44	17	17	22	23

TABLE 7

Recipients of ERC Consolidator Grants based in example European Member States and Associated Countries by nationality (2009 – 2014)[96].

Associated countries

	National of the host country (%)	National of any other European country, based in host country (%)	National of any non-European country, based in host country (%)	Any foreign national, moving to the country specifically for the Grant (%)	Total number of grants received
UK	65	26	7	3	407
FRANCE	70	17	9	4	231
GERMANY	76	15	6	4	274
SWITZERLAND	33	43	18	7	120
ISRAEL	100	0	0	0	79
NORWAY	57	22	13	9	23

TABLE 8

Recipients of ERC Advanced Grants based in example European Member States and Associated Countries by nationality (2009 – 2015)[97].

Associated countries

	National of the host country (%)	National of any other European country, based in host country (%)	National of any non-European country, based in host country (%)	Any foreign national, moving to the country specifically for the Grant (%)	Total number of grants received
UK	74	17	7	2	438
FRANCE	75	15	7	3	223
GERMANY	73	17	5	5	279
SWITZERLAND	34	48	13	5	164
ISRAEL	96	1	1	1	81
NORWAY	60	20	12	8	25

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For further information
The Royal Society
Science Policy Centre
6 – 9 Carlton House Terrace
London SW1Y 5AG

T +44 20 7451 2500
E science.policy@royalsociety.org
W royalsociety.org

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