



Science Diplomacy



Science diplomacy refers both to the role scientific research activities can play in fostering positive international relations and to the use of diplomacy to support international science. It can be used in many ways, for example to promote national interests, address cross-border issues or tackle global challenges. This note outlines how science diplomacy is interpreted, the institutions and mechanisms through which it is conducted and current efforts to understand how it works. The note also considers the role science diplomacy could play post-Brexit as the UK maintains relationships with the EU while cultivating new ones further afield.

Background

Science diplomacy is both a driver and a by-product of international science. Science diplomacy has happened for years, but stakeholders across the world increasingly speak of its potential in building diplomatic relations.^{1,2} Science diplomacy initiatives are principally facilitated by governments, intergovernmental organisations and not-for-profit organisations. Individual scientists act as important enablers through their participation in international collaborations and conferences.³ Brexit is focusing attention on the role science can play in maintaining the UK's relations with EU member states and building partnerships beyond Europe.⁴

Science and diplomacy play an interconnected role in developing multilateral responses to global challenges. For example the interaction of scientists and politicians has directed the work of the Intergovernmental Panel on Climate

Overview

- Science diplomacy is recognised as an effective way of bringing countries together to work on shared challenges, from responding to emergencies to implementing the sustainable development goals.
- Initiatives are delivered through several mechanisms, such as science attaché networks, international collaborations, co-operation between national academies and dedicated funding programmes.
- Most observers agree that science diplomacy works well if it revolves around excellent science that generates mutual benefits. Relationships between individuals are also a key factor in its success.
- However, the impact and effectiveness of science diplomacy activities are not fully understood. This will be the subject of three new EU funded research programmes.
- The UK Government considers that science and innovation can work as an important springboard in maintaining links with the EU and developing international partnerships post-Brexit.

Change (IPCC).⁵ Similarly science diplomacy is an important dynamic in international policy discussions about emerging technological trends such as cloud computing.⁶ Scientific co-operation can also help to build or strengthen relationships in sensitive contexts (Box 1).

The term science diplomacy has become more common since the American Association for the Advancement of Science (AAAS) increased its focus on this area, for example by opening a Center for Science Diplomacy (2008), publishing a joint report with the Royal Society (2010)⁷ and launching the journal *Science & Diplomacy* (2012).⁸ The joint report described science diplomacy as having three interwoven strands: science for diplomacy (using collaborations to improve international relations), science in diplomacy (using evidence and scientific expertise in the formulation of foreign policy) and diplomacy for science (the promotion and support of international scientific co-

Box 1. Using science as a bridge in Middle Eastern relations

- Middle Eastern scientists have been forging links with each other since 2003, developing co-operative approaches to regional science and technology challenges at biannual workshops.⁹
- Following a 2009 speech at Cairo University, President Obama announced the appointment of US science envoys to some Islamic states, as part of his administration's Middle East policy.¹⁰
- In 2015, credit for the progress in negotiations between Iran and six world powers to limit Iran's nuclear programme went to the two physicists, one Iranian and one American, who worked on the scientific details of the deal.¹¹

operation). Since the report's publication, academic programmes, workshops, conferences and institutes dedicated to the topic have multiplied, both in the USA and other countries, and a number of governments have appointed scientific advisers to their foreign ministries.¹² A more recent analysis of the field identifies three reasons why states invest resources in science diplomacy and international science: advancing national needs, addressing cross-border issues (such as public health crises) and tackling global needs and challenges (for example security of energy supplies).¹³

Science on the international stage

International collaborations in scientific research can help to achieve some of the goals of science diplomacy. They can improve national innovation capacity and competitiveness, produce shared scientific achievements which encourage the development of economic, diplomatic and political ties, or support the management of shared spaces that are not subject to exclusive state authority. Science has become a global enterprise, involving governments, the private sector, international scientific bodies, non-state organisations and individual researchers.¹⁴ A recent UK government report shows that the UK is a diverse, successful and competitive research nation.¹⁵ However the dynamics of the global scientific landscape are changing as countries such as China, South Korea, India, Brazil, Turkey and Argentina invest heavily in science.^{14,16}

Excellence in science

For researchers the primary focus of their international activities is to achieve excellence in science through collaboration. Papers published as a result of international collaborative projects have a wider impact, and are consequently rated more highly in the UK's Research Excellence Framework.^{14,17} There are various dedicated funding programmes to support international collaboration (Box 2). In the UK international collaborations are facilitated chiefly by government departments, the individual research funding councils that will merge into UK Research and Innovation (UKRI) in April 2018,¹⁸ the British Council,¹⁹ the UK Space Agency,²⁰ the national academies,²¹ non-profit organisations such as the Marine Stewardship Council and CRDF Global,²² universities and other research organisations.²³ A recent report by the UK Collaborative on Development Sciences discusses the role funders play in ensuring international partnerships are equitable.²⁴

Box 2. Major programmes for international collaborations

Many UK funds encourage new global partnerships, including:

- Newton Fund: £735m for capacity building and collaborative solutions to development challenges in emerging economies; local partners match the UK investment.²⁵
- Fleming Fund: £195m for research on antimicrobial resistance.²⁶
- Ross Fund: £400m for research in developing products that will combat infectious diseases in developing countries.²⁷
- Global Challenges Research Fund: £1.5bn to tackle global challenges in the national interest by strengthening capacity and providing agile responses to emergencies.²⁸
- Industrial Strategy Challenge Fund: £1bn to address issues such as healthcare, robotics, artificial intelligence, clean energy, driverless vehicles, composite materials and space technology.²⁹
- Ernest Rutherford Fund: £100m to attract highly skilled researchers from overseas to the UK.³⁰

The €80bn EU Horizon 2020 programme encourages international co-operation and widening participation.³¹

Scientists can also have practical reasons for cultivating international partners since they may want to use research facilities unavailable at home, gather data from larger populations or carry out fieldwork in areas that are hard to access or that cross geopolitical boundaries. In some cases diplomats can facilitate the agreements and relationships that scientists require to conduct their work. For example, scientists may need diplomatic assistance in arranging the export of samples or data gathered during fieldwork.³²

Getting science into policy

Evidence and scientific expertise are used to inform foreign policy decisions and objectives (Box 3). Best practice in international science is incorporated into domestic or intergovernmental policymaking, for example when the UN drew up the Sendai Framework for Disaster Risk Reduction.³³

Some issues are global in nature and cannot be tackled by individual states, and one of the functions of science diplomacy is to support efforts to address global challenges which often require cross-disciplinary expertise from different countries such as the implementation of the 2015 Sustainable Development Goals (SDGs).^{34,35} Another example is managing the threat posed by space debris to military and civilian satellites.³⁶ Global research infrastructures and the practice of open science, whereby the results of scientific research and data are made openly accessible, are seen as essential in tackling these agendas.^{34,37,38} In global negotiations over responses to antimicrobial resistance and climate change, access to scientific evidence has been a vital component in steering consensus for joint action.

Science as moderator in contested areas

In areas that fall under international law (Antarctica, the high seas, the atmosphere and outer space),³⁹ science is often the basis for agreement over their governance.^{40,41} Preserving a role for science in these areas can help counter attempts by individual nations to appropriate them for commercial or military uses.⁴² In the Arctic, the 2017 Fairbanks Declaration recognises the importance of science to informed decision-making and peaceful co-operation.⁴³

Box 3. The impact of science advice in emergencies

The availability of scientific advice and exchange of data is critical in developing coherent responses to cross-border emergencies.^{44,45}

- The UK Government Chief Scientific Adviser and the Scientific Advisory Group for Emergencies carried out a risk assessment after the nuclear accident at Fukushima Daiichi in 2011. An FCO report describes how British Embassy staff remained in post and provided clear, credible advice to British nationals; this was also made publicly available.⁴⁶
- In February 2016 the Zika virus outbreak was declared a public health emergency of international concern.⁴⁷ Risk assessments carried out by the European Centre for Disease Prevention and Control helped to co-ordinate responses by EU member states.⁴⁸

Mechanisms for science diplomacy

Foreign ministries make use of science to promote diplomatic relations, and some employ science advisers and science attachés to do this. They rely on a range of mechanisms to support their aims, such as the signing of bilateral agreements, exploiting historic ties between national academies, funding international collaborations and participating in large experimental facilities.

Science attaché networks

The Foreign & Commonwealth Office (FCO) and the Department for Business, Energy & Industrial Strategy (BEIS) operate a Science and Innovation Network (SIN) with ~90 science and innovation officers in 34 countries. Officers identify opportunities that bring together research institutions, universities and industry, focusing on specific themes such as clean energy, quantum technology and manufacturing to increase global impact.⁴⁹ SIN officers also support trade partnerships, a recent example being the introduction of UK robotics companies to potential Japanese partners.⁵⁰ Many other countries operate similar networks.

Science advisers and overseas connections

Twelve nations have appointed scientific advisers to their foreign ministries.⁵¹ The FCO appointed its first Chief Scientific Adviser (CSA) in 2009,⁵² and the role entails diplomatic activities alongside promoting the use of evidence in policy making.⁵³ A 2014 House of Lords Select Committee report asked the Government to consider greater integration of science within foreign policy strategy, to which the Government responded by incorporating sessions on science policy into special training for diplomats.^{54,55} The current FCO CSA, Professor Robin Grimes, says that the FCO applies science diplomacy to the UK's relationship with six nations: India, South Africa, Israel, Argentina, Russia and Turkey. These are countries whose bilateral relationships with the UK can be complex, but these nations are open to scientific collaborations as a way of developing their own science and technology capabilities.⁵⁶

Collaborations can help strengthen bilateral relationships and support the FCO's stated objectives of keeping UK citizens secure, projecting global influence and promoting prosperity.⁵⁷ Other government departments conduct research overseas but science diplomacy is not their primary motivation (Box 4).⁵⁸ However the outgoing

Box 4. International research in other government departments

- The Home Office has a long-standing relationship with the US Department of Homeland Security, including a joint research programme to counter terrorism and organised crime.
- The Department for Environment, Food & Rural Affairs (Defra) has a similar goal to keep abreast of global research developments while also contributing to capacity building in other countries. Defra's Centre for Environment, Fisheries and Aquaculture Science is involved in many programmes such as research to support sustainable tuna fisheries in Indonesia.
- Programmes run by the Department for International Development focus on research to support the developing world, such as looking at the effect of local weather patterns on agricultural and industrial productivity in India.
- The Department for Business, Energy & Industrial Strategy directs funding into international research (Box 2).
- The Ministry of Defence has participated for many years in a multinational collaborative research programme run by NATO's Science and Technology Organization.⁵⁹

Government CSA, Sir Mark Walport, recently emphasised how all departmental CSAs contribute to building international collaborations: "With our exit from the European Union, our global scientific partnerships are extremely important, and I believe that my job and the job of the network of CSAs is to engage with the scientific community globally".⁶⁰

Leadership positions in multilateral settings

Occupying key positions in intergovernmental organisations is another way in which individual nations can influence global science-related policy decisions.⁶¹ The UK's SIN network can provide important support for well-qualified candidates to make their case for these positions.⁶² Some commentators call for stronger links between domestic science advisory structures, foreign ministries and decision-makers in intergovernmental agencies, especially when discussing heavily science-dependent agendas such as the SDGs.¹³

Bilateral agreements

Ministerial visits can lead to national bilateral scientific agreements, which can pave the way for more formal political commitments (Box 5); individual departments (Box 4), funding agencies and learned societies also sign such agreements. These are becoming more important as the UK prepares to leave the EU. In September 2017 the UK and USA signed their first bilateral science and technology agreement, which included a UK commitment of £65m towards a new particle physics experimental facility in Illinois.⁶³ A memorandum of understanding was signed in the same month between the UK and Canada to co-operate in science, technology and innovation.

National academies and learned societies

National academies and learned societies make significant contributions to the progress of science diplomacy through their global networks.^{64,65,66} Operating independently of government, these academies co-operate on research programmes. For example the Royal Society recently convened meetings with Russian counterparts on topics

Box 5. Recent bilateral UK-Argentina activities

- An FCO Minister visited Argentina in September 2016, following a visit by the FCO CSA in April 2016. Science collaboration was identified as a pillar of future activities.
- Argentinian Science Minister Professor Lino Barañao visited the UK in November 2016 and signed a statement of intent with UK Universities and Science Minister Jo Johnson for collaboration.⁶⁷
- UK Universities International has negotiated participation in the Argentinian BEC.AR scholarship scheme, bringing 20 students a year to the UK to study STEM subjects at Masters level.⁶⁸
- The National Council of Scientific and Technical Research and the Royal Society signed a memorandum of understanding (MOU) to promote research exchange and collaboration.
- The Argentinian Ministry of Science, Technology and Productive Innovation (MinCyT), the Crick Institute and GSK have set up an exchange programme for researchers.
- MinCyT and Rothamsted Research Laboratories signed an MOU to explore collaborative opportunities.

ranging from black holes and palaeontology through to science diplomacy itself.

Funding programmes

In 2015 the UK government committed to spending 0.7% of gross national income on official development assistance (ODA) which is targeted at poverty reduction, sustainable development and improving welfare.⁶⁹ Shortly afterwards the government published a new aid strategy which spread the ODA budget more widely across government departments.⁷⁰ These developments have been the subject of an inquiry by the House of Commons International Development Select Committee.⁷¹ The resulting funding structures have led to new forms of international research collaboration (Box 2). One example is support for research into urban planning in India by the Newton Fund.⁷²

Support for international scientists is also disbursed through a range of scholarships and academic fellowships offered by the UK Government and universities. These attract students from overseas to study and work in the UK and create an important basis on which to build and sustain international teams.⁷³

Joint experimental facilities

Large infrastructure projects, such as the European Organization for Nuclear Research (CERN) in Geneva, have substantial budgets and specialist staff requirements that are beyond the scope of individual countries. One of the by-products of these multinational working environments is science diplomacy. Scientists working in them can develop long-lasting, cross-cultural relationships that bridge difficult political situations.

Proposals for these infrastructure projects are often driven by an incentive to stimulate co-operation as much as for a need to build scientific capacity. However realising these projects can require negotiations about location, intellectual property rights and investment returns. The motivation to build CERN was to unite European scientists after WWII, and to create a new laboratory.⁷⁴ Similarly the new SESAME synchrotron in Jordan brings researchers together

from across the Middle East.⁷⁵ Such facilities provide neutral physical spaces that have been used to host highly sensitive meetings. When USSR-USA arms negotiations in 1985 stalled, a dinner was hosted at CERN for Soviet and American scientific advisers which facilitated a subsequent breakthrough.⁷⁶

Diasporas and displaced scientists

Strong professional networks of scientists working outside their own countries can stimulate and facilitate science diplomacy activities. These communities share news on funding and career opportunities that pull international teams together. Scientists work in different countries for many reasons, but in some cases deteriorating political or environmental circumstances have forced them to leave their homelands.⁷⁷ Charities such as the Council for At-Risk Academics (Cara) or Scholars at Risk help scientists to continue working through adverse situations, whether they stay in their home country or seek to build a new life elsewhere.⁷⁸

Understanding the impact of science diplomacy

Some argue that there is a risk of overselling the potential of science diplomacy, pointing out that its effectiveness is not yet fully understood.^{79,80} The complexity of the international scientific landscape means that the outcomes of science diplomacy are difficult to predict. Most observers agree that science diplomacy works well if it revolves around excellent science that generates mutual benefits. Relationships between individuals are also a key factor in its success. Some commentators argue that in situations where scientists have a sense of being used for political purposes, this can be counter-productive.⁸¹ Scientists can also be unaware of the broader geopolitical contexts in which they are operating.⁴⁵

It is widely agreed that there needs to be more evaluation of the short and long-term impacts of science diplomacy activities.⁸² The European Commission is funding three programmes that aim to assess the impact of science diplomacy activities, the first reporting in 2019 and the others by 2021.^{83,84,85}

Science diplomacy and Brexit

The importance of research partnerships with the European Union makes science and innovation one of the Government's Brexit negotiating objectives; this has been the subject of parliamentary scrutiny.^{86,87,88,89} Any new frameworks to enable collaboration will require political and scientific input. The Department for Exiting the EU has appointed a CSA who will act as a conduit for advice provided by the rest of the CSA network.⁹⁰ In the recent Industrial Strategy white paper the Government announced plans for an International Research and Innovation Strategy with UKRI and a £110m fund for international collaborations to enhance the UK's position as a global science leader.⁹¹

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