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POST

Science Diplomacy

Rapid response

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A overview of science diplomacy, outlining its role in scientific collaborations and to support international diplomatic relationships, and a resume of recent developments.

This Rapid Response provides an overview of science diplomacy, including its potential to promote international scientific collaboration, to co-ordinate global responses to shared challenges and to support the cultivation of diplomatic relations in both peacetime and settings of conflict resolution. This review updates the [Science Diplomacy POSTnote](#) published in 2018.

Summary

- **The concept of science diplomacy has emerged in the last 20 years. It is an umbrella term that encompasses political support for science in an international context, including the formal and informal exchanges that lead to cross-border research collaborations, science advice for international policymaking and public engagement activities.**
- **Popular definitions of science diplomacy stem from a 2010 report published jointly by the UK's Royal Society and the American Association for the Advancement of Science.**
- **Science is seen as a fundamental element in the UK Government's strategy to position post-Brexit Britain on the global stage.**
- **Advocates for science diplomacy consider that science is a global enterprise with shared values that lends itself to fostering international relations. However, science is also an inherently competitive exercise with scientific advancement seen as fundamental to ensuring national prestige. At times this can create tension between nations. Science underpins individual nations' competitive advantage in innovation-based economic activity while national security and critical infrastructures depend on a nation's technological capabilities.**
- **Some commentators are calling for the development of evaluation methods to assess the impact of science diplomacy activities on enhancing national branding and international influence, enabling access to third party knowledge and contributing to conflict resolution.**

What is Science Diplomacy?

Science diplomacy is understood to be a tool and practice that strengthens relations between nations. The phrase is acknowledged to be a convenient and flexible umbrella term for a range of activities that occur when scientific research and international relations align to promote national interests and international alliances. It occurs through networks of scientists, diplomats and other stakeholders whose activities underpin and enable bilateral and multilateral scientific collaborations.

The concept of science diplomacy has increasingly gained currency since [the 2010 publication of a joint report](#) by the UK's Royal Society and the American Association for the Advancement of Science. The term 'science diplomacy' is often used as a synonym for scientific collaboration across borders or science advice in policymaking.

An overview of the settings and proponents of science diplomacy is given in [POSTnote 568](#), from February 2018.

The enhanced levels of international scientific co-operation in the co-ordinated global response to the COVID-19 pandemic – for example through the World Health Organization's [Access to COVID-19 Tools Accelerator](#) – is noted by some academic observers as proof of science diplomacy in action.

The pandemic necessitated [the engagement of policymakers with scientific experts](#), demonstrating the need for the rapid provision of robust scientific evidence in global policymaking. Having depended on scientific evidence to inform their responses during the pandemic, governments are tending to give data and science a more central role in their future plans. This includes recognising its potential to create economic wealth, support national security, cultivate transnational relations, consolidate public support, and solve global challenges such as climate change and the energy crisis.

Academic research into science diplomacy

Considerable [EU research funding](#) has been awarded in recent years to the academic study of the concept of science diplomacy and its applications, with the publication of many historic and contemporary [case studies of science diplomacy in action](#). For example, one case study explores the impetus behind [a collaboration between public health experts](#) in the Mississippi Delta in the US and Iran, and the challenges encountered.

An outcome of these science diplomacy research projects is the publication of [a protocol](#) that seeks to steer science diplomacy activities towards addressing shared challenges rather than the pursuit of national interests.

Some academics have sought to establish fixed definitions of the concept and [are wary that its expanding use might result in either empty promises and/or misappropriation](#). However, practitioners operating at the interface of science and international affairs note that the non-confrontational and creatively ambiguous term has the advantage of being useful in opening dialogue on sensitive topics.

Science as a strategic tool for the UK

The UK Government's 2021 post-Brexit strategy document [Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy](#) positions science as fundamental to the UK's ability to tackle societal challenges and boost prosperity. The review referred to the UK as a 'science superpower' and initiated a new UK science agency, the [Advanced Research & Invention Agency](#) (ARIA). Science is ranked alongside diplomacy as a tool that will enable the UK to achieve its strategic goals and extend its influence overseas.

In August 2022, [the House of Lords Science and Technology Committee urged](#) the Government to implement delivery of these ambitions for science.

Ministerial responsibility for science, research and innovation is centred in the [Department of Business, Energy and Industrial Strategy](#), and the establishment of a [cabinet committee](#) – the National Science and Technology Council – indicates a continuing focus within government on pursuing these ambitions for science.

Science diplomacy as an international tool

Science diplomacy is increasingly being articulated as a formal goal within national and

intergovernmental strategies. For example:

- the [European Commission's \(EC\) 2021 strategy for international co-operation in a changing world](#) refers to science diplomacy as a tool to help the EU project soft power and pursue economic interests and values more effectively;
- the promotion of science diplomacy has been incorporated into the most recent version (2021) of the [OECD's recommendation for international co-operation in science and technology](#);
- science diplomacy appeared in the [Areas of Research Interest published in 2020 by the Foreign & Commonwealth Office](#) (FCO) prior to its merger with the [Department for International Aid](#);
- in December 2020 the Foreign Office of the Federal Republic of Germany launched [a strategy paper](#) outlining a proposed shift from research and academic relations policy to science diplomacy to 'anchor cooperation between the fields of foreign policy, science, citizen science and scientific communication with engaged citizens in sustained international processes'; and
- the Swiss and Geneva governments founded the [Geneva Science and Diplomacy Anticipator](#) (GESDA) in 2019 to develop solutions to future technological challenges.

However, since the outbreak of war in Ukraine, these aspirations are [subject to changing circumstances](#), with some stakeholders suggesting that conducting collaborative cross-border research needs to be weighed up against security implications.

Ambitions for science diplomacy to sustain global scientific co-operation and effect change are reflected in the launch of a range of professional development and training programmes. Some examples include:

- a [Global Science Diplomacy programme](#) offered by the UN Environment Programme for students around the world to learn the use and value of science in environmental decision-making, and science communication skills;
- a [free online science diplomacy course](#) developed by the EU S4D4C research project;
- a [Science and Technology Diplomacy summer school](#) set up in Barcelona; and
- the inclusion of a module on science diplomacy in [training for new recruits to the Indian Foreign Service](#).

Science diplomacy in action

Science diplomacy occurs in a variety of settings through a range of interactions that can involve representatives from national governments, intergovernmental organisations, the charitable sector and the scientific community.

Science diplomacy occurs in formal negotiations conducted by career diplomats and through unofficial, non-structured interactions known as Track 2 diplomacy. [Science diplomacy practitioners](#) include those people working at the interface of science and international relations.

International collaborations

Science diplomacy is seen as part of the process in bringing international researchers together in new research collaborations or in the signing of bilateral or multilateral science and technology agreements.

Oceans, being beyond the reach of national sovereignty, often feature strongly in academic analyses of successful science diplomacy. The [All-Atlantic Ocean Research Alliance](#) is cited in the [EC's 2021 international research and innovation strategy](#) as a science diplomacy success story. The project has gathered scientists, policymakers and public and private stakeholders together to improve understanding and stewardship of the Atlantic Ocean.

Such collaborations are regarded as effective and advantageous vehicles for cultivating scientific excellence, advancing knowledge and stimulating innovation and are [therefore sought after by nation states](#) to enhance their global scientific reputation.

Collaborative programmes are regarded as a fruitful environment in which to build relationships of trust and co-operation between nation states and the individual team members. For example, [discussions between meteorologists in the USA and Cuba over sharing weather data](#) led to the

development of a formal agreement to install shared GPS monitoring equipment in Cuba.

The pandemic highlighted the strength of international collaborations but also amplified pre-existing tensions inherent in such partnerships such as discrepancies in regulatory environments, incompatible political values, limited knowledge-sharing, conflicting ethical standards and intellectual property theft.

Academic scientists seek to protect the intellectual property that they have created, and UK Research and Innovation (UKRI), Universities UK and the Centre for the Protection of National Infrastructure have published guidelines on managing risk and identifying trusted research partners in international collaborations. Delegations overseeing bilateral and multilateral science and technology co-operation agreements usually include heads of the relevant intellectual property office.

Large, shared, experimental facilities also represent environments for science diplomacy, with senior policymakers and scientists from participating member states working together to manage the governance and research programmes in these organisations. At ITER, a shared fusion energy facility in southern France, 35 nations are collaborating to build the world's largest experimental device to advance thermonuclear fusion science; these include the EU Member States, the UK, China, India, Japan, Korea, Russia, and the United States.

Diplomats carry out science diplomacy when negotiating international frameworks for new technologies, stewardship of global commons and trans-boundary regions, and when building consensus to address global challenges. In advance of the UK's hosting of COP26, the 2021 UN climate change conference, the UK's Foreign, Commonwealth and Development Office (FCDO) created a Climate Diplomacy Fund to support activities that promoted COP26 goals. This initiative was designed to build conditions that would lead to a successful outcome in multilateral negotiations while encouraging increased in-country commitment to climate change. The diplomatic arm of the EU, the EU External Action Service, cites science diplomacy as key to establishing partnerships that will achieve the commitments made at COP26 and in meeting the UN's 17 sustainable development goals (SDGs).

Creating more equitable science systems

Systems of national and international research are in flux, as funders of science push for open access and a reconsideration of how to evaluate the reach and impact of research. The conduct of science increasingly involves large data sets and the use of artificial intelligence (AI). Adapting to new ways of working and technologies is sometimes described as 'Science 4.0'.

Different regions have varying capacity in adapting to these changes. For example, researchers in Africa report being disadvantaged when their institutions cannot afford to pay for journal subscriptions or article processing charges, and where internet access is inadequate.

Science diplomacy is considered to have a role in creating a more equitable global science system that considers regional and local resources, access to data and opportunities to publish.

Science diplomacy advocates enthuse about the commonalities of science, such as the predominant use of the English language, and shared universal values which facilitate transboundary relationships. However social scientists are increasingly emphasising how science can be used for political and economic purposes. They sometimes note that Indigenous knowledges are often side-lined, for example in the Arctic.

Science in policymaking

Science diplomacy can also be understood as the process of using science advice in the policymaking sphere where international relations overlap with science.

An increasingly common mechanism for this is the appointment of chief scientific advisers to foreign ministries, who act as a link between civil servants, politicians and scientific experts in academia or the private sector.

Learned societies also play a role in cultivating links between the scientific and policymaking communities. For example, in 2019 the Royal Society hosted an event for diplomats to discuss how severe weather incidents would impact demands for emergency services from diplomatic missions overseas.

However, scientists may lack the experience, time or skills needed to react to the fast pace of rapidly evolving political situations and the speed of operations in diplomatic circles.

Science diplomacy in a changing world

Science diplomacy is described as [entering a 'post-naïve' era](#) in response to systemic changes in global science combined with the political backdrop of the UK's withdrawal from the EU and the war in Ukraine.

The UK's withdrawal from the European Union

Funding cuts or withdrawal from established partnerships can have a detrimental effect on the relationships of trust built up over several years between researchers.

The Royal Academy of Engineering reported the challenge of [communicating at short notice, to long-standing international partners](#), the UK Government's 2021 [cuts to ODA funding](#). Similar experiences were submitted [to a UKRI survey of the impact of these cuts](#) on research partners in developing nations. However, collective efforts between some grant holders and partners to ensure their research programmes have continued is seen as demonstrating the intrinsic value in relationships between individual researchers within these research organisations.

The withdrawal of the UK from the EU is [impacting on long-established patterns of collaboration between EU member states and the UK](#). EU researchers coming to work in the UK are now subject to immigration rules and entry is dependent on [their eligibility to apply for a visa](#) under the Global Talent, Skilled Worker or Government Authorised Exchange categories.

Uncertainty continues about [the future ability of UK-based researchers and businesses to receive key sources of EU research and innovation funding](#) such as the Horizon Europe programme and the European Structural and Investment Funds (ESIF). [Association of the UK and Switzerland to Horizon Europe has been delayed](#) due to political disagreements with the EU that have not been resolved, adding complexity to the future of collaborative projects. Observers comment that [this impasse](#) indicates how science diplomacy practitioners should recognise that [science can be used as a bargaining tool](#), as well as one that promotes international co-operation.

However, science diplomacy has shaped efforts to encourage a positive dialogue between the political and science communities over association to Horizon Europe. National educational bodies and learned societies in UK and Switzerland have spearheaded the pan-European 'Stick to Science' campaign, which uses the language of science diplomacy in arguing for "open and barrier-free collaboration among Europe's research and innovation actors, who all share the same values." The UK FCDO's SIN has communicated the UK's position to its research partners in the EU Member States where it is active.

The UK's withdrawal from the EU has stimulated a flurry of bilateral science diplomacy activity, with the UK signing several science and technology agreements with other nations. For example, in July 2022 the UK signed [a research, science and innovation arrangement with New Zealand](#) through which New Zealand expertise in agritech will be shared with UK industrial partners. [A data-sharing agreement between the UK and USA](#) was signed in late 2021.

Contested regions

While champions of science diplomacy advocate its potential as a soft power tool that can positively influence areas of diplomatic tension, there is [increasing recognition that science can be used uncompromisingly in political crises](#).

Following the Russian invasion of Ukraine in February 2022, [the UK and other nations](#) have introduced sanctions including some on research and innovation activities. Sanctions are targeting international research collaborations that are involved in the transfer of technology to Russia, especially in the defence sector. [The US Treasury has added several high-technology entities to its sanction list](#), including [Skoltech](#), a private research-focused university that was set up in 2011 in a science diplomacy exercise with the advisory guidance of the Massachusetts Institute of Technology.

[UK state funding for projects with a Russian dimension have been paused](#), and communication regarding collaborative projects run by SIN have been suspended. UK HEI institutions have suspended formal relations with their Russian counterparts and some offer [guidance for researchers on how to adhere to the sanctions regime](#). However, it is expected that scientists will [continue to collaborate on an informal basis](#) and academic journal editors are advised to [continue accepting submissions](#) regardless of country of origin.

During periods of armed conflict, science diplomacy continues to be used to create positive outcomes for those researchers whose work is directly affected by the sanctions. Examples of the

many initiatives to support those affected by the war in Ukraine include:

- [an agreement between the US National Academy of Sciences and the Polish Academy of Science](#) to support Ukrainian scientists;
- more than [70 twinning partnerships](#) have been signed between UK and Ukrainian universities; and
- the UK Government has announced a package of support for Ukraine's science and technology sector, including funding for the '[Researchers at Risk](#)' programme set up in April 2022 by UK learned societies and [Cara](#) (the Council for At-Risk Academics). Cara facilitates partnerships that enable the expertise of academics in exile to continue to have impact in their home country. The [Syrian Food Futures project](#) brings together researchers based in the UK and Syria with those living in Turkey, Jordan and Lebanon who are affiliated with the Cara Syria Programme.

The interruption of scientific relations with Russia is having an impact on [scientific co-operation in polar regions](#). In the Arctic, science diplomacy works towards [assembling scientific expertise from across the circumpolar region to understand the impact of environmental change](#) on biodiversity, local populations and physical geography. An example of such collaboration is the [European-Russian Centre for co-operation in Arctic and sub-Arctic research](#), a project to bring international researchers to work in the Nansen International Environmental and Remote Sensing Centre, a research facility in St Petersburg shared by Norwegian, German and Russian institutions.

Participation in scientific collaborations offer an opening for [non-Arctic nations to gain a foothold in the region](#), for example the Polar Research Institute of China has signed a long-term agreement with an Icelandic organisation to operate the [China Iceland Arctic Research Observatory](#) and China maintains [a research station on the Norwegian territory of Svalbard](#). Some member states of the Arctic Council nations and those on the periphery are pursuing opportunities to leverage environmental changes to extend their global power. The breakdown of relations with Russia means that [international climate scientists are no longer able to conduct fieldwork in Russia](#) to gather the data they need.

Evolving diplomatic priorities

Since the merger of the FCO and DfID in 2020, [FCDO scientific research](#) is largely funded through the reduced official development assistance (ODA) budget and focuses on supporting delivery of the UK's priority development objectives.

The emergence of new priorities in diplomacy are leading to [a stronger governmental focus on incorporating science and technology into foreign and security policies](#). Innovative, emerging technologies are fuelling a global race for technology supremacy which is [changing traditional patterns of international relations](#). The war in Ukraine has highlighted the growing influence of privately owned high-tech companies in conflicts between nation states.

A [recent report](#) from the House of Commons Science and Technology Committee recommended that the FCDO further develop "technology diplomacy" to understand which firms pose a risk to national security and how diplomats should interact with privately-owned entities. [Evidence to the committee](#) indicates that the FCDO and other departments are developing an international science and technology strategy. [The appointment of the FCDO's first technology envoy to the US](#), based near Silicon Valley, shows the department is developing new approaches in science diplomacy.

Looking ahead

The [House of Lords Science and Technology Committee recently stated](#) that there was an "urgent" need to rebuild international scientific relationships in the wake of Brexit and ODA funding cuts.

[Innovative diplomatic approaches](#) are also required to deal with technological change and emerging geopolitical tensions. For example, some academics [are calling for the development of clear protocols](#) for collaborating with partners in authoritarian regimes.

Academic observers caution against the overuse of 'science diplomacy' in the absence of clear definitions or evaluations to avoid squandering the term's potential to energise the use of science in international relations. Understanding science diplomacy's effectiveness and impact on the countries involved remains limited.

Further reading

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- [Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy](#), Cabinet Office, UK Government 2021
- House of Commons Foreign Affairs Committee, [Encoding values: Putting tech at the heart of UK foreign policy](#), July 2022
- House of Lords Science and Technology Committee [“Science and technology superpower”: more than a slogan?](#), August 2022
- Tim Flink, [Taking the pulse of science diplomacy and developing practices of valuation](#), April 2022

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