USING SCIENCE FOR/IN DIPLOMACY
FOR ADDRESSING GLOBAL CHALLENGES

S4D4C EUROPEAN SCIENCE DIPLOMACY ONLINE COURSE

MODULE 2

What Is Science Diplomacy?

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Practical information

This module takes a minimum of 3 hours

Document version

This module has been updated with new content since its launch in June 2020. This new module version has been made publicly available in April 2022.

How to cite this content

If you want to refer to this content, please use:

Lorenzo Melchor, Izaskun Lacunza, Ana Elorza, Peter McGrath, Charlotte Rungius, Tim Flink and Ewert J. Aukes. 2020. What Is Science Diplomacy? In: *S4D4C European Science Diplomacy Online Course*, Module 2, Vienna: S4D4C.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 770342.

S4D4C EUROPEAN SCIENCE DIPLOMACY ONLINE COURSE MODULE 2 – WHAT IS SCIENCE DIPLOMACY?

Table of Contents

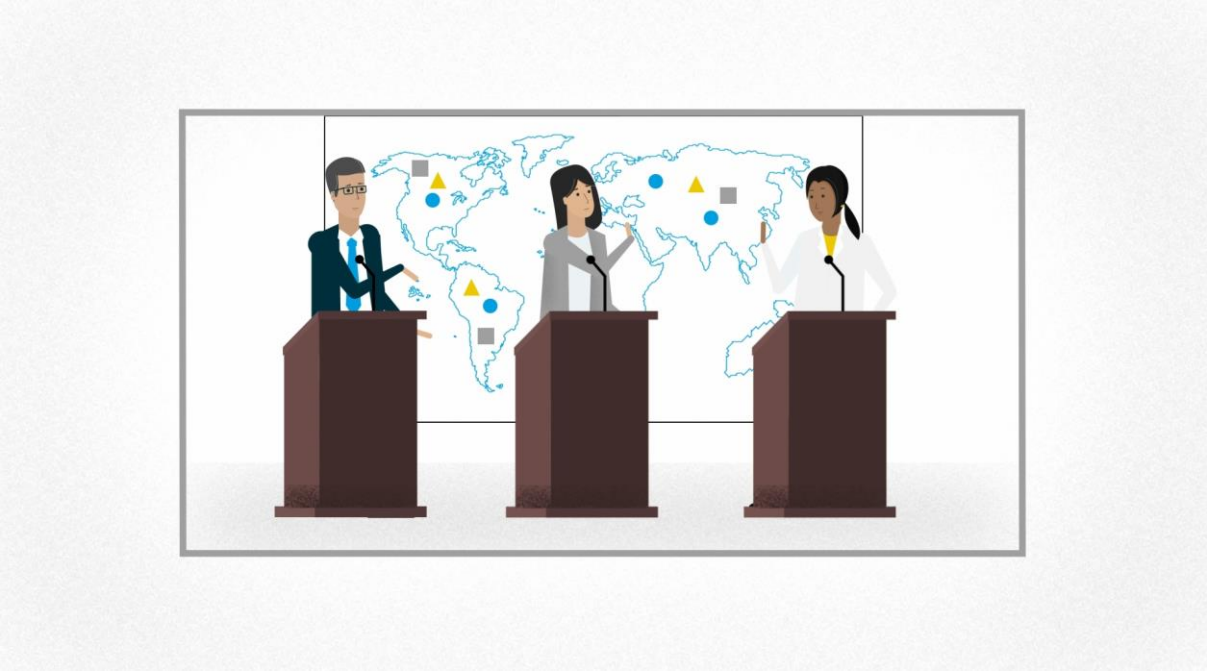
2.1 Introduction to the Module

Learning objectives

This module aims to define the complex concept of science diplomacy. Throughout this lesson, we will give you answers to the following questions:

- What is science diplomacy? Definitions for "science diplomacy", which has become an umbrella term due to its different meanings and people's understandings.
- What kind of science diplomacy approaches are there? An overview of different conceptual frameworks for science diplomacy, which allow us to frame the nature of specific science diplomacy activities.
- Who works in science diplomacy? Examples of a variety of practitioners who work in the interface between science and international relations.
- What skills are required to work in this field? A brief overview of some skills that will be further explained in Module 6.

The following video captures a general introduction to the topic of science diplomacy for addressing global challenges and the required interactive spaces between scientists, diplomats, and policymakers.



S4D4C Video: What Is Science Diplomacy for Addressing Global Challenges

Experts' preliminary insights

We have invited a group of experts to give us some preliminary insights about the question "What is science diplomacy?". Their explanations will help to establish the foundations on which we will build up your knowledge.

	**Alexander Degelsegger-Márquez** Head of Digital Health and Innovation at Gesundheit Österreich GmbH (Austrian Public Health Institute). Former S4D4C project coordinator.
	What is science diplomacy? Video Link to YouTube

	**Peter Gluckman** Chair of the International Network for Government Science Advice (INGSA)
	What is science diplomacy? How many types of science diplomats are there? Video Link to YouTube

	**Mona Nemer** Chief Science Advisor to Canada's Prime Minister and Minister of Science
	How important do you think science diplomacy is for international relations? Video Link to YouTube

Some Questions to reflect on after watching the videos

These questions are posed for you to reflect individually about the main messages put by our experts in science diplomacy. Please, take some time to think about them.

- Do you think science diplomacy is a recent activity or an old activity that has been rebranded recently?
- Do you think there is a common understanding about what science diplomacy actually means? Do different professionals or countries understand it or use it in the same way?
- Who do you think would be the most suitable professionals to fulfil roles in science diplomacy?

2.2 The Worlds of Science and Diplomacy

Before defining the whole concepts and theoretical approaches to science diplomacy, it is important to introduce you to each of the worlds involved in this interface: the scientific, technological and innovation systems, on the one hand; and the international relations and diplomacy, on the other hand.

In the next two topics, you will have a brief introduction to each system, to then question current challenges that are present in both systems in the third topic.

2.2.1 How Does Science Work? An Overview

All sectors of society (commerce and industry, government and diplomacy, NGOs, etc.) have their own specific ways of working. Science is no different – having evolved a series of practices over the past 200 years that are more or less standard around the world.

The "source material" for this "science ecosystem" can be considered as the **universities** who provide a cadre of trained individuals (with PhD degrees) capable of taking up positions in science. Such positions may be within the universities themselves, with **research centres** (many of which are national, but others may be either international or private), or perhaps in **the private sector** (e.g. the pharma or energy industries).

In many countries, including much of Europe, early career scientists typically move after obtaining their PhD degrees from one postdoctoral position to another (the "postdoc treadmill") gaining valuable experience and building their reputations until they are offered a post as a **principle investigator (PI)**.

PIs have the added responsibility of **sourcing additional funds from competitive sources** – for example national research councils (e.g. DFG in Germany, CNR in Italy, UKRI in the UK, AEI in Spain) or perhaps joining consortia to apply for EU funding under Horizon 2020, Horizon Europe or other Framework Programmes.

With funds available, PIs can build the physical structure of their labs, perhaps purchasing leading-edge equipment from one of many laboratory supply companies, and also build their research team, taking on postdocs and providing training to PhD students of their own. In practice, building such a team is critical to the career of a PI, as much of their time is spent chasing the next major grant. This means that PIs must rely on their team members to produce the other major output of the scientific enterprise – new data that can be developed into research publications.

Scientific publishing itself is a major industry, with many large and influential publishing houses active (e.g. Elsevier, Springer, Wiley), other "open access" publishers (e.g. PLOS) emerging over recent years, and even "predatory" publishers who accept a fee from unsuspecting scientists who wish to see their work in print. When it comes to scientific publications, however, reputation is everything, with researchers aiming to publish their papers in the most prestigious journals possible (e.g. Science, Nature, The Lancet) – i.e. those considered to have the highest "impact factor" and that would give the researcher's work greatest visibility. This gives researchers' work a greater likelihood of being read and cited by others, further building up their credibility. And with this

comes increased chances of gaining additional grants, expanding the research team, perhaps eventually being elected into the national academy of sciences, etc.

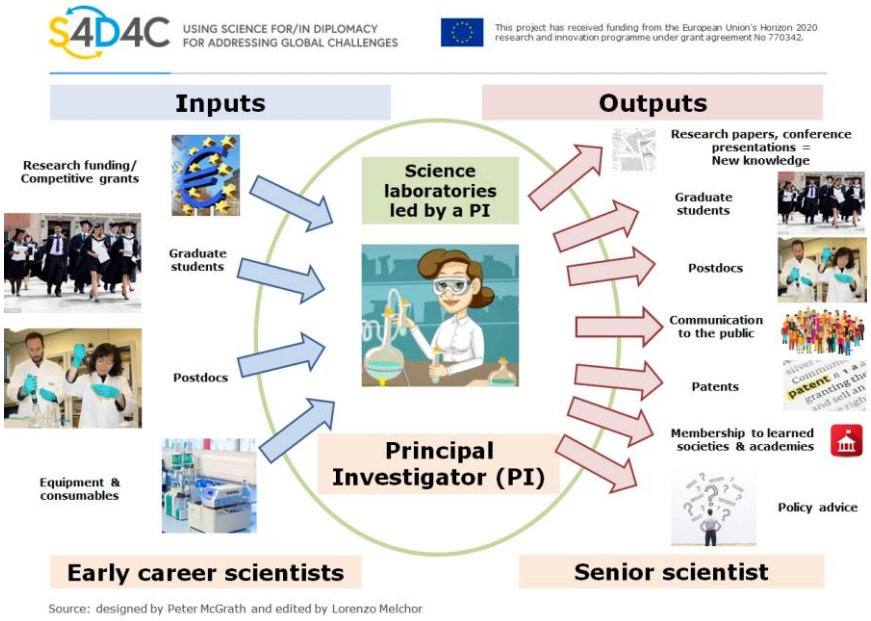


Figure 1. The role of scientists as a principal investigator with their sets of inputs and outputs. Source: designed by Peter McGrath and edited by Lorenzo Melchor.

It is important to note that this system of publishing, whether open access or via private publishing houses, relies on **a system of "peer review"** – whereby other scientists provide expert feedback to the authors and editors to ensure and maintain the highest academic standards. However, it is important to note that scientific fraud does take place (typically through the fabrication or falsification of data or other questionable research practices, e.g. "cherry-picking" data). When such practices are exposed, the papers are typically retracted from the published record and authors can face severe reputational penalties.

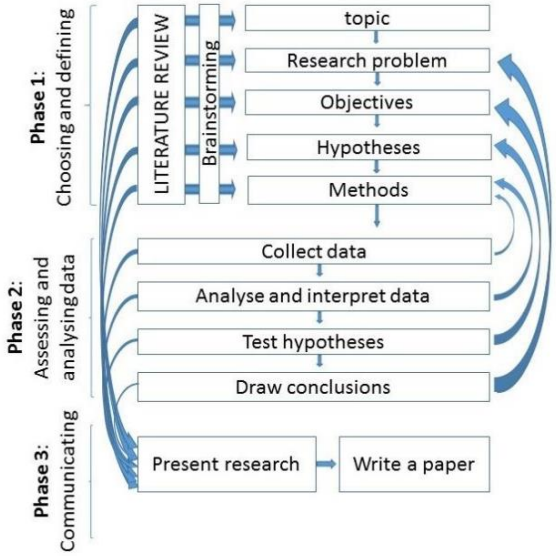


Figure 2. The scientific research process. Source: designed by Peter McGrath.

As PIs compete and develop their careers as researchers, so they often get more and more involved in **scientific societies and unions**, of which there are many covering all the fields of science. Such societies and unions of scientists, as well as the merit-based **science academies**, provide opportunities for scientists to raise their collective voices on issues of relevance to their particular field. Certain high-profile scientists, e.g. Nobel Prize laureates, may also be able to raise their voice on their own accounts. By working together around particular issues, scientists' voices may reach the public and/or decision-makers where they can begin to influence policy.

At the international level, there are **international organisations** such as the InterAcademy Partnership (IAP, which brings together more than 140 academies of science and medicine) and the International Science Council (ISC, that includes academies and scientific unions among its members). ISC itself has the mandate to convene the Scientific and Technological Community Major Group (STC MG) that is invited to feed in the voice of the global scientific community to various UN deliberations, e.g. pertaining to the Sustainable Development Goals (SDGs).

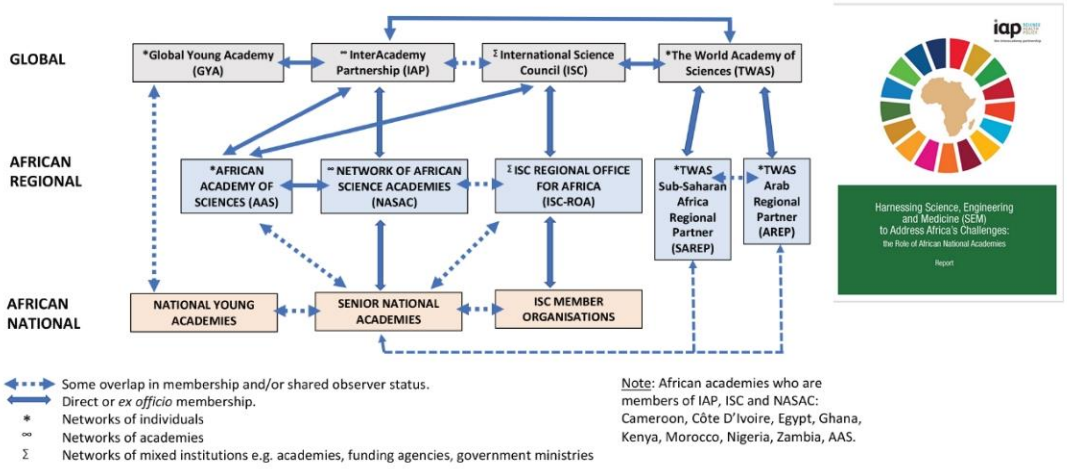


Figure 3. Schematic of academies' landscape in Africa and connections to global academy institutions. Source: image extracted and adapted from figure 2.1 from IAP Report (2019) "Harnessing Science, Engineering and Medicine to Address Africa's Challenges: The Role of African National Academies" (Link).

Working with such groups, directly with UN organisations, or contributing to reports of, for example, the Intergovernmental Panel on Climate Change (IPCC) or the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), allows scientists to participate in areas of science advice and science diplomacy.

Read more about how science works:

- MacKenzie, Julia J (2020): "What Science Can Offer." *Science & Diplomacy*, (March 2020) (Link).
- Mayer, Katja (2020): Open Science Diplomacy. In: Young, M., Flink, T., Dall, E. (eds), *Science Diplomacy in the Making: Case-based Insights from the S4D4C Project*, Vienna: S4D4C (Link).
- S4D4C (2020): *Stakeholder's Voices #5: A Conversation with the Co-Chairs of the InterAcademy Partnership: Peggy Hamburg and Krishan Lal*. Stakeholder's Voice Blog Series, 9th July 2020, Vienna: S4D4C (Link).

2.2.2 The System of Diplomacy and International Relations

Diplomacy is the use of dialogue, negotiation and representation in international relations. Embassies and consulates that a country deploys abroad are key components of the diplomatic infrastructure (Ruffini, 2017).

The **Vienna Convention on Diplomatic Relations** (1964) defines the main functions of a diplomatic mission of a sending state in a receiving state as: representing the sending state to protect its interests and those of its nationals; ascertaining conditions and developments in the receiving state, and negotiating with the government of the receiving state and finally, promoting friendly relations and developing economic, cultural and scientific relations with the receiving state.

Nation states make therefore use of diplomacy at the bilateral level (with another nation state), at the regional level (with other nation states that have an interest or are geographically located at a specific region), or at the global level being part of intergovernmental or international organisations (IGO).

The increase of complexity in diplomacy over the centuries has promoted the specialisation of diplomacy to specific fields or niches such as science diplomacy, climate diplomacy, education diplomacy, water diplomacy, cyber diplomacy, *techplomacy*, and so forth.

International Relations are an area of study in social sciences and humanities that covers matters of politics, economics, and law at the global scale. It focuses on the relationships between political entities or *polities* of different nature (Nation states, IGOs, non-governmental organisations, multinational corporations…) with the world systems that result from it.

Read more

About International Relations:

- Baylis, John and Steve Smith (Eds.) (2004): *The Globalization of World Politics: An Introduction to International Relations*, Oxford: Oxford University Press, 3rd edition.
- Burchill, Scott, Andrew Linklater, Richard Devetak, Jack Donnelly, Matthew Paterson, Christian Reus-Smit, and Jacqui True (2005): *Theories of International Relations*, Basingstoke: Palgrave, 3rd edition.
- Bjola, Corneliu; and Markus Kornprobst (2013): *Understanding International Diplomacy: Theory, Practice and Ethics*. London: Routledge, chapters 5-8.
- Roach, Steven C., Martin Griffiths, and Terry O'Callaghan (2014): *International relations: the key concepts,* London: Routledge.

About International Law:

- Dixon, Martin. (2013): *Textbook on International Law*. Oxford: Oxford University Press, 7th Edition.
- Seidl-Hohenveldern, Ignaz von; and Torsten Stein (2000): *Völkerrecht,* Heymmans, 1st Edition. (In German).

About European Law:

- Barnard, Catherine; and Steven Peers (2017): *European Union Law*, Oxford: Oxford University Press, 2Nd Edition.

- Hafner, Gerhard; Andreas J. Kumin, and Friedl Weiss (2013): *Recht der Europäischen Union: Eintwicklung, Institutionen, Politiken, Verfahren,* Vienna: Manz. (In German).

About Economics, especially for basic concepts, fundamental concepts of macroeconomics, microeconomics, supply, demand and product markets, economic role of governments, international trade, and the world economy:

- Samuelson, Paul A.; and William Nordhaus (2010): *Economics*, New York: McGraw Hill, 19th edition.

About History:

- Renouvin, Pierre; and Jean-Baptiste Duroselle (1997): *Introduction à l'histoire des relations internationales*, Pocket. (In French)
- Craig, Gordon A. (1995): *Geschichte Europas 1815-1980*, Beck. (In German)
- Kissinger, Henry A. (1995): *Diplomacy*, New York: Simon & Schuster.

2.3 Science Diplomacy in the World Today

After these brief introductions, this topic focuses on the current state of matters for both worlds. Globalisation and the growth of interdependence, as well as digitalisation, have affected both the system of science and that of diplomacy. This brief explanation will set the scene to focus on the interactive space that science diplomacy actually represents.

Let's get started!

Science, Technology and Innovation

Science, technology and innovation, have been a global enterprise or joint endeavour throughout history and many different civilisations. The history of each scientific discipline is unique and so is that of how countries established their own research and innovation national systems mainly during the 20th Century. The leading efforts of the United Nations and especially the Organisation for Economic Co-operation and Development (OECD) helped national governments to establish their research and development systems, and have a common language about science and technology policy as well as economic development policy, involving forms of research, research areas, division of professional sectors, research and innovation indicators, types of scientists, etc. (see The OECD Frascati Manual).

As a consequence, **the international science system comprises a rich constellation of stakeholders**: international scientific organisations, national governments and research councils involved in funding research and innovation, academic institutions such as universities, research centres and public foundations, international and national academies and learned societies, large research infrastructures, large companies and SMEs, NGOs, private foundations and charities involved in funding and many different stakeholders interacting at all levels of governance.

The increasing globalisation has also had an impact on science, technology and innovation, as it has improved the exchange of knowledge, resources and talent worldwide, but certain challenges remain (Royal Society, 2011). Similar to what occurs in the diplomatic perspective, the rise of **new scientific powers** (China, India, Brazil, etc.) and the **emergence of scientific nations** in the Middle East, South-East Asia and North

Africa both help explain the shift to an increasingly multipolar scientific world, where Western nations no longer retain control or are leaders in the field.

International scientific collaborations are increasing at an exponential pace, academic papers resulting from international collaborations are demonstrated to have a bigger impact than those resulting from just national collaborations.

Individual scientists move easily between national borders seeking to work with the best of their peers and to gain access to complementary resources, equipment and knowledge. This **talent circulation** needs careful consideration from nations as they may face challenging scenarios (brain drain). New creative approaches need to be implemented to keep scientists abroad engaged with their national systems for both knowledge exchange and new international mobility opportunities.

Lastly, science and technology will produce **solutions to global challenges** such as climate change, energy sustainability, infectious disease, food security, etc. These challenges will not only require international scientific collaboration, global policy implementation will also be mandatory if they are to be tackled and solved.

Diplomacy

Traditional diplomacy has dominated international relations for nearly five centuries and is very different from today's diplomacy. Adding to the traditional bilateral diplomacy, states are today involved in issues that affect several countries at once, the **community of nations as a whole**. In addition to their traditional framework of embassies, states also have permanent missions to international organisations in New York, Geneva, Rome, Vienna or Paris.

The community of nations underwent profound transformations with the dissolution of the Soviet Union and the rise of **new powerful nation states** such as China, India, Brazil and the Asian Tigers.

With a new balance of power, the world has also witnessed **a growth of networks of interdependence** that transcend national and regional boundaries. The world today is more complex, interdependent and interconnected than ever before (Kehoane and Nye, 2000). Both **globalisation and digitalisation** are transforming our societies to a large extent: trade, financial markets, international relationships, knowledge and cultural exchanges, communications and transportations.

The **complexity** and **interdependence** of the world today makes any big or small alteration in any network point be felt immediately on the other side of the network. From economic crashes to exchange of information (or misinformation), the effects register almost instantly.

The international landscape has also witnessed the increasing relevance of **additional stakeholders in public diplomacy** such as Small and Medium Enterprises (SMEs), universities, Regional Organisations, Non-Governmental Organisations (NGOs) and civil society movements. These new players take advantage of international conferences to express themselves, lobby and influence the international legal framework.

Public opinion and global branding have become key factors in the international image of a country. Harnessing a country's **"soft-power" tools or intangible assets** such as culture, tourism, cuisine, cinema, or science, technology and innovation (Copeland, 2009) is a new way to act or be perceived as a decision maker in contrast to the use of coercive means, such as military power or payments, traditional "hard power" tools. Therefore countries combine strategically hard- and soft-power tools in what can be framed as "**smart power**" (Nye, 2004).

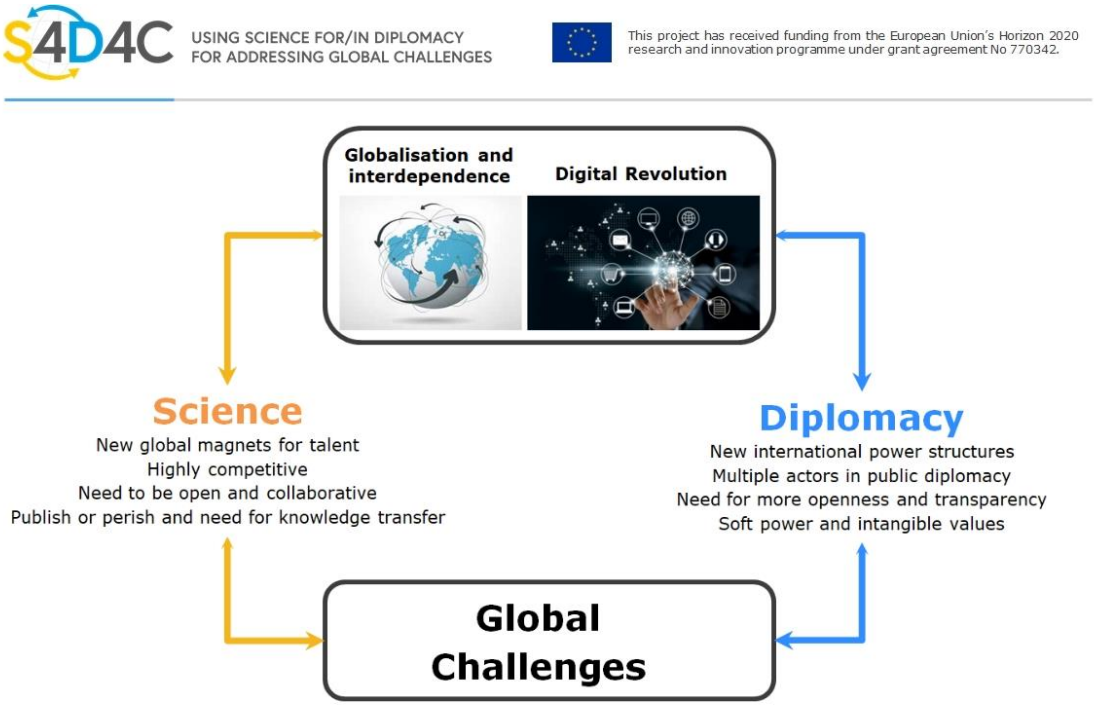


Figure 4. The impact of globalisation, interdependence, and digitalisation on science and diplomacy. Source: designed by Lorenzo Melchor using different sources of information (Royal Society, AAAS, 2010; Royal Society, 2011; Nye, 2004; Copeland, 2009).

The interactive space of science and diplomacy

Under this global and complex scenario, there is a need to build a common ground of mutual trust and understanding between the scientific and diplomatic communities. Science and technology are becoming increasingly more important in international relationships. As Daryl Copeland (2015) explains, this is because science, technology and innovation are drivers of:

- economic progress;
- equitable, humanitarian and sustainable development; and
- evidence-based decision making and public policy development, which are hallmarks of good governance and responsible public administration, so foreign policy must also check upon scientific evidence

As Grimes & Hennessey (2015) also point out science is a driver for international cooperation to reach common goals and it can be included within a nation's soft-power toolkit.

As scientists and diplomats rarely interact with each other on a day-to-day basis, the need for a transboundary field such as **science diplomacy** that will foster more networking, trust and mutual understanding among these is more important than ever.

Science diplomacy is relevant, effective, and potentially transformative. It can play a key role in responding to some of the most elemental challenges facing the international community (Copeland, 2015). In the following topics, you will learn different definitions and theoretical approaches to increase your understanding of this complex and multidimensional concept.

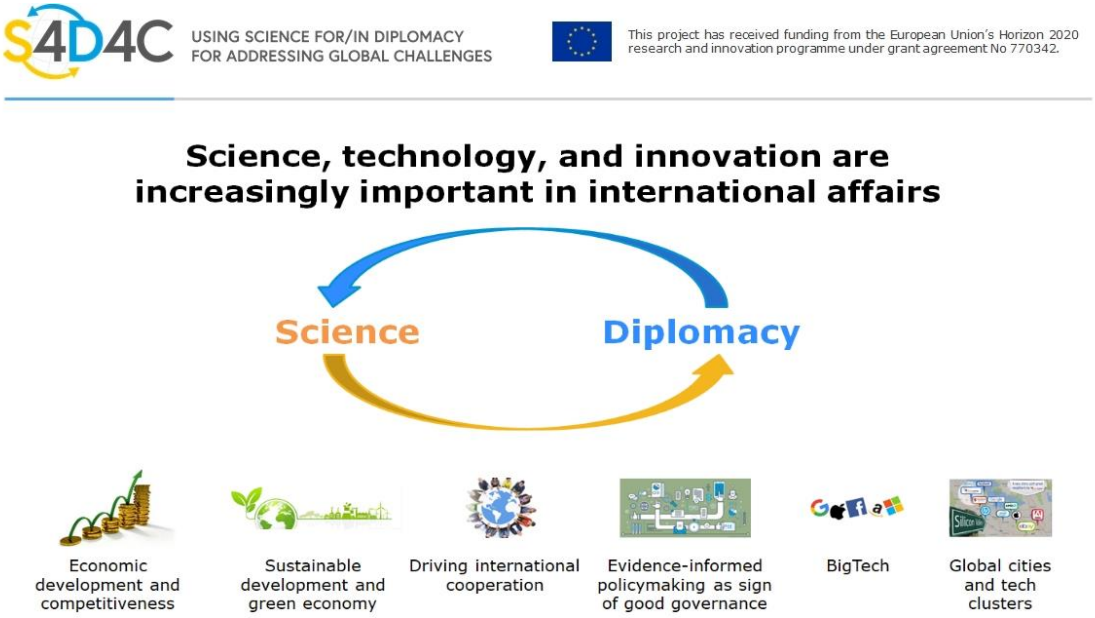


Figure 5. The increasing role of Science, Technology and Innovation in International Affairs. Source: designed by Lorenzo Melchor using different sources of information (Copeland, 2015; Grimes, Hennessey, 2015; Ruffini, 2017).

Read more about the current world scenario using the references below:

- Copeland, Daryl (2009): *Guerrilla Diplomacy: Rethinking International Relations*. Boulder: Lynne Rienner Publisher. ISBN: 978-1-58826-679-8.
- Copeland, Daryl (2015): "Bridging the Chasm: Why Science and Technology Must Become Priorities for Diplomacy and International Policy." *Science & Diplomacy*, Vol. 4, No. 3 (September 2015) (Link).
- Grimes, Robin; and Hennessey, Emma (2015): "Why Science Is in the Diplomatic Toolkit." *Science in Parliament* Vol 72, No 2, May/June (Link).
- Kehoane, Robert O. and Joseph S. Nye (2000): "Globalization: What's New? What's Not? (And So What?)." *Foreign Policy*, Spring, pp. 104-119.
- Nye, Joseph S. (2004): *Soft Power: The Means to Success in World Politics*. Public Affairs: New York.
- Royal Society, The (2011): *Knowledge, Networks and Nations: Global scientific collaboration in the 21st century*. Royal Society Policy Document 03/11. London: The Royal Society. March. (Link).
- Ruffini, P-B. (2017): What is Science Diplomacy?, In: Ruffini, P-B., *Science and Diplomacy: A New Dimension of International Relations*, Cham: Springer International Publishing, pp. 11-25.

2.3.1 What Do We Mean by Science Diplomacy?

The first thing you need to understand when approaching the definition of "science diplomacy" is that **there is not a single understanding or definition for this concept**. Countries and professionals understand the concept in many different ways, as it has become multidimensional, multi-layered, very complex and has multiple meanings. As Chagun Basha suggests, "*science diplomacy has become an umbrella term covering a range of formal and informal exchange, education, policy, and outreach efforts*" (Basha, 2016), implying there is a risk of overstretching the concept.

The second important thing is that **science diplomacy is not something new**. International relationships that can be framed under "science diplomacy" have been taking place since the beginnings of human civilization: from the exchange of knowledge and scientific tokens in Ancient Egypt, Mesopotamia and Greece in the Western world to the Silk Road. International treaties for nuclear disarmament and scientific cooperation between the United States and the USSRR during the Cold War can also fall under this broad category. Other international treaties for the governance and scientific cooperation in ungoverned spaces such as Antarctica, oceans or even space may be understood as science diplomacy too. Another example of science diplomacy is the establishment of large research infrastructures that require the scientific cooperation of a number of countries that had been opponents in the past, such as CERN in Switzerland and SESAME in the Middle-East.

It is true, however, that **science diplomacy is a new term coined in a specific historical context** as part of a strategic foreign policy initiative. The inception of the term can be traced back to a US foreign policy initiative. This initiative endeavoured to re-establish US soft power and the country's reputation and image in the Middle-East and worldwide after the US-led invasion in Iraq in 2003. From there it has taken on a life of its own both as "an area of study and as a policy consideration" (Rungius *et al.*, 2018).

A broad definition: an interaction between science and foreign policy

Although there is not a singular concrete definition, what seems to be key in defining science diplomacy is the increasing role and relevance of science in world politics (Copeland 2016; Flink and Schreiterer 2010; Turekian *et al*., 2015). In fact, science diplomacy is more than just international scientific collaborations. Science diplomacy implies the involvement of political actors and interests, whereas international science collaborations do not necessarily involve them at all (Copeland, 2016; Gluckman *et al*., 2017) and indeed they are "sometimes commercially oriented and often without direct state participation" (Copeland, 2011).

You will find below a set of different definitions established by leading practitioners in the field over the last years:

«Science diplomacy is the use of scientific collaborations among nations to address the common problems facing 21st century humanity and to build constructive international partnerships. There are many ways that scientists can contribute to this process.»

— Nina V. Fedoroff,
Science and Technology Adviser to the Secretary of State and
to the Administrator of the U.S. Agency for International Development (USAID) 2009
(Fedoroff, 2009)

«The term 'Science Diplomacy' can be used for a range of foreign policy aspects which share an engagement with science and related disciplines but whose aims, motivations and practices are quite different.»

— Lutz-Peter Berg,
Swiss Embassy Head of Science and Innovation
(Berg, 2010)

«Science diplomacy has been defined as the use and application of science cooperation to build bridges and enhance relationships among countries.»

— Dr Vaughan Turekian,
Director of the Center for Science Diplomacy set up in 2009
by the American Association for the Advancement of Science (AAAS)
and later Science and Technology Adviser to the Secretary of State

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*«'Science diplomacy' is a **label** used by actors to refer to certain policies or actions that involve the engagement of scientific or cultural communities in transnational interactions. In both cases, those policies or activities can or cannot be labelled as Science Diplomacy by the actors themselves. When labelled by the actors as diplomacy policy or Science Diplomacy practices, one can refer to them as **explicit Science Diplomacy**. When not labelled as such, one can refer to them as **implicit Science Diplomacy**. In order to avoid a too broad approach to Science Diplomacy, one should limit the use of the concept to the explicit policies and practices that involve both S&T policy and Foreign Affairs policy.»*

— Prof Luk van Langenhoven,
Research Professor, Institute for European Studies (IES), Vrije Universiteit Brussel (VUB)
and coordinator of EL-CSID H2020-funded science diplomacy consortium
(van Langenhoven, 2016)

«At the intersection of science and foreign policy, a country's science diplomacy refers to all practices in which actions of researchers and of diplomats interact. These practices may be directly related to the interests of governments: this is the case when diplomats promote cooperation between scientists from different countries, whereas conversely international scientific relations facilitate the exercise of diplomacy or play an avant-garde role for it, and finally when scientific expertise helps governments and their diplomats to prepare and conduct international negotiations.»

— Prof Pierre-Bruno Ruffini,
Professor of International Economics, Faculty of International Affairs, University of Le Havre and
part of the InsSciDe H2020-funded science diplomacy consortium
(Ruffini, 2017)

Explicitness/Implicitness "Matter" in the Transversal Analysis of S4D4C Case Studies

Explicitness (or implicitness) refers to the use (or non-use) of the term "science diplomacy" by particular actors in particular situations to label themselves or their activities. The term science diplomacy is neither universally embraced nor entirely consistently used. There is a great deal of variance between national governments' understanding of the meaning of science diplomacy, its conceptualisation and its implicit or explicit use.

Our premise in S4D4C is that applying (or not applying) the label science diplomacy to a concrete interaction, practice or actor is political: it creates and changes power relations and affects outcomes. The term science diplomacy is rarely used to name concrete actions or actors. More often, it occurs in political debates and describes ideas and visions. A wide range of actions that could potentially be science diplomacy are not labelled as such. For some, alternative (sub) types of diplomacy or policymaking or other labels are applied, such as water, health or cyber diplomacy.

The implicit or explicit use of the label for a certain practice matters and it is often applied strategically. The explicit use may help to enhance legitimacy of respective actors and tier practices and raise attention for a specific practice. In other cases, actors chose not to introduce the term science diplomacy into a given context, to aoid the impression of non-cooperative dimension and maintain a context of soft-power.

More about "Explicitness/Implicitness 'matter'" can be found in (Young and Rungius, 2020).

What the experts think

Besides the experts we asked in the introductory topic **2.1 Science Diplomacy – Introduction to the Module**, we have here three additional experts who will give you their perspectives around what science diplomacy is. Enjoy their insights!

<table>
<tr><td>  </td><td>Pauline Ravinet
Assistant Professor of Political Science at CERAPS, University of Lille</td></tr>
<tr><td></td><td>How would you describe science diplomacy?
Video Link to YouTube</td></tr>
</table>

<table>
<tr><td>  </td><td>Robin Grimes
Chief Scientific Adviser (CSA) to the UK Ministry of Defence on nuclear science and technology matters. Former CSA to the UK Foreign and Commonwealth Office (FCO). Professor of Materials Physics at Imperial College London</td></tr>
<tr><td></td><td>What is a science diplomat? How many types of science diplomats are there?
Video Link to YouTube</td></tr>
</table>

	**Pier Francesco Moretti** CNR Liaison Officer in Brussels and coordinator of School for Science in Decision processes (#school4SID)
	Which challenges exist in the interface between science-policy-diplomacy? Video Link to YouTube

Read more about science diplomacy definitions in the following references:

- Berg, Lutz-Peter (2010): "Science Diplomacy Networks." *Politorbis* 2(49): 9–11.
- Copeland, Daryl (2015): "Bridging the Chasm: Why Science and Technology Must Become Priorities for Diplomacy and International Policy." *Science & Diplomacy*, Vol. 4, No. 3 (September 2015) (Link).
- Fedoroff, Nina V. (2009): "Science Diplomacy in the 21st Century." *Cell*, 136, January 9. pp. 9-11 (Link).
- Flink, Tim; and Ulrich Schreiterer (2010): "Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches." *Science and Public Policy*, 37(9), November 2010, pages 665–677 (Link).
- Rungius, Charlotte; Tim Flink, and Alexander Degelsegger-Márquez (2018): *State-of-the-art report: summarizing literature on science diplomacy cases and concepts*. Vienna: S4D4C (Link).
- Ruffini, Pierre-Bruno (2017): *Science and Diplomacy. A New Dimension of International Relations. Science, Technology and Innovation Studies*. Cham: Springer International Publishing (Link).
- Van Langenhoven, Luk (2016): *Tools for an EU science diplomacy*. Brussels: European Commission (Link).
- Young, Mitchell; and Charlotte Rungius (2020): Explicitness/Implicitness. In: Mitchell Young, Charlotte Rungius, Ewert Aukes, Lorenzo Melchor, Elke Dall, Eliška Černovská, Eliška Tomolová, Laure-Anne Plumhans, Pauline Ravinet, Tim Flink, Ana Elorza Moreno. *The 'Matters' of Science Diplomacy: Transversal Analysis of the S4D4C Case Studies*. S4D4C Policy Report. S4D4C: Vienna. pp:1-4.

2.3.2 The Royal Society and AAAS's Conceptual Framework

There is common agreement that the conference celebrated in June 2009 in London and jointly organised by the Royal Society and the American Association for the Advancement of Science (AAAS) represented a significant milestone in the story of "science diplomacy". This is because the concept of science diplomacy was given contemporary emphasis and currency, resulting in a turning point from which developed a global science diplomacy community and common understanding.

The overall discussion and conclusions were summed up in a policy report entitled "New frontiers in science diplomacy" (Royal Society, 2010). The report first provides a rough overview of the history and evolution of the role of science in foreign policy, including the recent and renewed interest in the concept of science diplomacy.

The report explores the universal values of science, namely rationality, transparency and universality, which can all help underpin good governance and build trust between nations. It also covers the changing dynamics of the power balance in the international landscape focusing on the role of science as a soft-power tool that can help in building influence and partnerships worldwide.

Having said this, the most influential outcome of the meeting, which is extensively covered in the report, is the establishment of **the first taxonomy for science diplomacy** that has become widely used ever since:

- **Science in Diplomacy**: informing foreign policy objectives with scientific advice
- **Diplomacy for Science**: facilitating international science cooperation
- **Science for Diplomacy**: using science cooperation to improve international relations between countries

At present, this taxonomy tends to be the starting point for most practical conceptualisations of science diplomacy. It represents a landmark contribution that should be known to every science diplomat, and provides a valuable framework for science diplomacy activities.

Science in Diplomacy

Science will be critical to addressing global challenges, and the priority of science in diplomacy should be to ensure the effective uptake of high-quality scientific advice by policy-makers, global leaders and diplomats.

This is why the scientific community must inform policy makers with up-to-date information on the dynamics of the Earth's natural and socio-economic systems, identifying scientific consensus as well as uncertainties or an inadequate evidence base.

Scientists are prompted towards supporting foreign policy, but it has a double-edged perspective depending on the times when this support is requested. In times of war, this has resulted in mobilising national scientific and technological resources for the development of weapons. In times of peace, this is about using scientific knowledge in foreign policy decisions. The overall goal of such activities is to improve Foreign Policy actions through the use of scientific knowledge.

Some examples of this approach are shown below:

- The best known example of a science advice mechanism for informing policy-making is the **Intergovernmental Panel on Climate Change (IPCC)**. A scientific panel established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences. Thousands of scientists from all over the world contribute to these reviews and periodic assessments on a voluntary basis, which are then used for global policy discussions.
- The role of national academies and learned societies as a source of independent scientific advice to international policy makers is also another "science in diplomacy" scenario. The report cites the role of the national academies of science of the G8+5 countries, the InterAcademy Partnership (IAP), among others.
- The collaborative efforts undertaken in the Geological Survey of Canada in the Arctic.

The report stresses the importance of building up capacity to give and receive scientific advice, providing as an example the AAAS Policy Fellowship Schemes, and other programmes to engage science with public policies around the world.

Diplomacy for Science

This approach focuses mainly on the facilitation of international scientific and engineering collaborations. This can be pursued with top-down strategic priorities for research or bottom-up collaboration between individual scientists and researchers.

Classical tools of diplomacy are put to use to support the scientific and technological community in building up together joint research programmes, flagship international projects (such as the International Thermonuclear Experimental Reactor, ITER), large research infrastructures (such as the Large Hadron Collider, LHC). Some of these projects require vast amount of resources and funds, which one country cannot withstand alone, thus international collaboration is key to build scientific projects in partnership.

The usual collaboration between individual scientists, researchers and institutions worldwide fits within this category too. The scientific endeavour is now more global than ever and scientific publications based on international collaborations are growing every day. Sometimes creating scientific collaborations in specific regions or with specific partners will require diplomatic assistance (contract negotiations, intellectual property, visa regulations, etc.) to build up research partnerships between both governments and other institutions. Thus, any bi- or multilateral research funding requires explicit diplomatic interactions or actions that can be said to contain "Diplomacy for Science" elements of standardizing, safeguarding and mediating (the role of "science diplomats" to staff of research ministries, project funding agencies, peer reviewers, funded institutions is certainly key).

The overall goal of actions under the "Diplomacy for Science" category is to benefit from international science and technology resources in order to improve the national capacity, as well as to build up joint partnership projects that one country alone could not undertake.

Science for Diplomacy

This approach goes one step further. Science and technology cooperation can be used as a tool to build and improve relations between nation states. Traditionally science has played a role in the development of hard power capabilities, such as military technologies and economic coercion, but "Science for Diplomacy" primarily draws on the "soft-power" of science to attract, persuade and influence both as a national asset, and as a universal activity that transcends national interests.

These activities can be done when there are difficult relations between certain states when states are faced with common problems that they cannot solve on their own, or when new relations are to be initiated. Some exemplary actions are science cooperation

agreements, the establishment of new institutions to foster collaboration or rebuild relationships among nations (as for instance CERN or SESAME), educational scholarships, negotiation or mediation processes, science festivals and exhibitions, etc.

Lastly, it may have had effects on the negotiations for international security and cooperation to monitor nuclear arm control agreements and disarmament, and to actively prevent environmental threats.

In general, scientific collaboration is used here to provide collaborative relationships that are based upon a non-ideological basis. The goal is thus to support Foreign Policy actions by mobilising scientific networks.

Read more about science diplomacy definitions in the reference below:

- Royal Society, The (2010): *New frontiers in science diplomacy*. RS Policy document 01/10. January 2010 - RS1619. London: The Royal Society (Link).

2.3.3 The Strategic Purposes Approach

Apart from the already well-known RS/AAAS conceptualization, Flink & Schreiterer (2010) have proposed another substantive differentiation or typology to conceptualize science diplomacy. Deriving from an analysis of the concrete *actions* that state actors have shown, these authors distinguish between three strategic purposes to characterise different varieties of policies and strategies to promote international scientific cooperation and enact science diplomacy:

- **Access**: improvement of national innovation capacity and competitiveness by better benchmarking international research and development trends and policies, observing and seizing knowledge and technology markets elsewhere in the world as well as attracting talents and investments from abroad. Access-driven actions can be used to ease tensions between states, build trust, manage or prevent conflicts, or to be involved in extremely expensive "big science" projects that no country can afford to run alone, such as the International Space Station.

- **Promotion**: marketing of a country's achievements in the research and development landscape and raising interest in a country's S&T, therefore improving its reputation. The main aim is the attraction of students, researchers and companies to build up national capacities, reputation and performance, stir innovations or enhance its innovative capacities, and lay grounds for international partnerships.

- **Influence**: addressing the most explicit political and soft power aspect of science diplomacy, influencing other countries' public opinion, decision-maker and political or economic leaders. Science and technology activities as a promising entry point for engaging citizens and civil society organisations worldwide. The universal values of science and a more rational approach in policy-making processes that will reinforce democracy, are both embedded in this policy goal. The main challenge here, as opposed to international science cooperation, is bringing

together the world of science and diplomacy, teaming up professionals and different players with a set of particular strategic interests and global concerns.

Read more about this conceptual framework in the reference below:

- Flink, Tim; and Ulrich Schreiterer (2010): "Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches." *Science and Public Policy*, 37(9), November 2010, pages 665–677 (Link).

2.3.4 The Pragmatic Approach

Four renowned chief scientific advisers to Foreign Ministries have postulated an alternative classification based on a pragmatic reframing. The authors argue that while the Royal Society and AAAS's approach has been useful for academic and theoretical discussions, the concept proves fairly imprecise in real-life scenarios: neither does it capture all relevant elements nor does it provide clear political responsibilities.

In their experience, a focus on why a country might invest efforts and resources in science diplomacy and international science could be the basis for a more utilitarian framing of science diplomacy, and one that better resonates with government agencies.

Therefore, they suggest a more utilitarian science diplomacy framework based on three categories:

- **Actions designed to directly advance a country's national needs.** This group would comprise the exercise of soft power to increase the impact of a country worldwide, to become more strategic in identifying how science relationships can promote trade and advance broader diplomatic interests, or to assist in development with science information and building science partnerships between donor and recipient countries. It would include national security and emergency response too, as science and technology can inform about transnational scientific responses and assistance, or be engaged in arms control treaties on scientific verification. The economic dimensions fall also within this category as more and more scientific and health parameters are included in trade regulations, intellectual properties and manufacturing products among different countries, etc. Lastly, national Science, Technology and Innovation systems benefit from these approaches as they engage globally with other research and innovation agencies, with their own scientific diasporas, or access large research infrastructures not present in their own systems.

- **Actions designed to address cross-border interests**. These involve bilateral or cross-boundary issues, the use or access to shared resources (such as gas fields, fish stocks, etc.), and the exploitation of shared technical services (pharmaceutical regulation, food safety assessment, etc.).

- **Actions primarily designed to meet global needs and challenges**. In this group, we would include the Sustainable Developmental Goals (SDGs), which comprise a global context for development and partnership where both developed

and developing countries can have measurable goals for increasing their international and domestic development activities. The SDGs provide an excellent meeting point for global interests and national priorities. These actions would also involve the access to and scientific exploitation of Ungoverned Spaces (such as the Antarctic, the digital world, or space).

What the experts think

Chagun Basha

DST-Science, Technology and Innovation Policy Fellow, Department of Science & Technology, Government of India – Centre for Policy Research (DST-CPR), the Indian Institute of Science, Bangalore, India

How do you think science diplomacy can be instrumental to face global challenges?

Video Link to YouTube

Read more about this pragmatic approach in the reference below:

- Gluckman, P.D., V. Turekian, R. W. Grimes, and T. Kishi (2017): "Science Diplomacy: A Pragmatic Perspective from the Inside." *Science Diplomacy*, Vol. 6, No. 4 (December 2017) (Link).

2.3.5 The Madrid Declaration on Science Diplomacy

In December 2018, a group of worldwide high-level experts on science diplomacy gathered in Madrid to celebrate the 1st S4D4C Global Networking Meeting "EU science diplomacy beyond 2020". As a result of their discussions, they endorsed the publication of the "Madrid Declaration on Science Diplomacy".

This document aims to foster agreement and raise awareness about the need to strengthen science diplomacy strategies and practices world-wide for the support of universal scientific and democratic values. Including science and technology as key dimensions of foreign policy and international relationships at different political levels would undoubtedly bring benefits for the joint scientific endeavour, but also to broaden political and societal objectives.

The Madrid Declaration refuses to strictly define the concept of science diplomacy. Instead, it understands it as "**a series of practices at the intersection of science, technology and foreign policy**" and highlights the growing importance of science diplomacy on a global level.

The endorsers of the declaration firmly believe that:

1. Science diplomacy is often not fully exploited at all levels of governance, and especially at supranational levels;

2. More explicit science diplomacy strategies at national and supranational levels would allow for more effective alignment of interests and more efficient coordination of resources.

Benefits

The Madrid meeting also concluded that the potential of science diplomacy is yet to be fully harnessed, citing the following unrealised **science diplomacy benefits**:

1. Actions to address global challenges
2. To achieve more productive and sustainable international relations at multi and bilateral levels
3. The use of evidence-informed foreign policies to base on substantive and resilient international agreements, treaties and policies
4. The improvement of conditions for scientific activities due to the contribution of foreign policy agendas
5. An improved interface between scientists, policy-makers, diplomats and civil society to remove barriers and foster collaboration, leading to better public policies

Principles

Lastly, the Declaration focuses on the **principles to foster science diplomacy worldwide**:

1. Value for citizens: governments, diplomats and researchers are encouraged to acknowledge and demonstrate science diplomacy as a fundamental and universal tool to improve international relations in general
2. Methodological diversity: not all relevant science diplomacy practices are labelled as such, assigning the label is a strategic choice
3. Demonstrable impact: to the measurement and recognition of the potential effect or impact of science diplomacy activities
4. Evidence-informed foreign-affairs policies: which can either be content-related (e.g. climate change), context-related or process-related
5. Collaboration and inclusion: the need to recognize the role of multiple stakeholders in science diplomacy beyond the classical nation-states, which brings new governance and coordination mechanisms that need to be considered
6. Capacity building: all stakeholders would benefit from exchange and suitable capacity building activities fostering cutting-edge, interdisciplinary and intergenerational spaces.
7. Independence of science: where science autonomy is respected and not distorted by ideological goals

Endorsing the declaration

Two years after the celebration of this conference, over 165 experts across the globe had endorsed the Madrid Declaration on Science Diplomacy and the document has stirred public and policy debate to deploy better science diplomacy approaches. You may learn

more about this conference and S4D4C vision of science diplomacy in the topic **3.1.2 The S4D4C approach to science diplomacy: A multi-stakeholder endeavour**.

Read more about the Madrid Declaration on Science Diplomacy here:

- S4D4C (2019). *The Madrid Declaration on Science Diplomacy*. Madrid: S4D4C. Available on: https://www.s4d4c.eu/s4d4c-1st-global-meeting/the-madrid-declaration-on-science-diplomacy/
- Cassis, Ignazio (2019). "Science diplomacy as an innovative tool in our international relations." Opinion article on *Swissinfo.ch* #20yearsSWI, 8 Nov. Available on: https://www.swissinfo.ch/eng/swiss-foreign-minister-op-ed_science-diplomacy-as-an-innovative-tool-in-our-international-relations/45354504

2.3.6. Science Diplomacy for Addressing Global Challenges: Stoppers, Warnings and Drivers

The use of science diplomacy for addressing global challenges and societal needs has been object of extensive academic study and policy support as a way to reinforce multilateralism. Successful stories, such as the Montreal Protocol to tackle emissions of chlorofluorocarbons (CFCs) and other ozone-depleting agents (Whitesides, 2020), or the Paris Agreement to tackle climate change (Ollivier-Mrejen, Michel, and Pham. 2018), have further strengthened a science diplomacy scope focused on addressing global challenges.

As a matter of fact, S4D4C has focused a lot of efforts in trying to understand what processes may block, challenge, or drive any effort to undertake this type of science diplomacy strategy. As a result, S4D4C has identified a set of stoppers, warnings, and drivers that are specific to the systems of science, diplomacy, and science diplomacy (Melchor, Elorza, and Lacunza, 2020).

You may find below a summary figure containing these elements using the analogy of traffic lights. For instance, scientific and research misconduct with the lack of research integrity can affect people trust in science, reduce the impact of research investment and also harm people in the environment (a stopper in the system of Science), the lack of a more personalised training for scientists or for diplomats can reduce opportunities for better cooperation (a warning in the systems of Science and Diplomacy), current socio-political fractures in the European Union or the uptake of nationalisms, protectionism and populisms may deter countries to collaborate via science diplomacy (Stoppers in the system of Diplomacy), or the use of good examples of science advice mechanism and of developmental cooperation frameworks may be considered drivers in the systems of Science, and Diplomacy, respectively.

You may download our S4D4C policy executive booklet or our S4D4C full policy report.

Figure 6. Stoppers, warnings and drivers for addressing global challenges: stoppers in red lights, warnings in amber lights, and drivers in green lights. Columns represent the nature of the system of said item: the first column addresses items related to science, technology and innovation; the second column comprises items related to diplomacy; and the third column involves items related to science diplomacy. Source: image extracted from (Melchor, Elorza, and Lacunza 2020).

Read more!

- Melchor, Lorenzo; Ana Elorza, and Izaskun Lacunza (2020): *Calling for a Systemic Change: Towards a European Union Science Diplomacy for Addressing Global Challenges*. V1.0. S4D4C Policy Report, Madrid: S4D4C (Link).
- Ollivier-Mrejen, Raphaël; Pierre Michel, and Minh-Hà Pham (2018): "Chronicles of a Science Diplomacy Initiative on Climate Change." *Science & Diplomacy*, Vol. 7, No. 2 (June 2018) (Link).
- Whitesides, Greg (2020): "Learning from Success: Lessons in Science and Diplomacy from the Montreal Protocol." *Science & Diplomacy*, Vol. 9. No. 2 (June 2020) (Link).

2.3.7. A Critical Reflection on the Science Diplomacy Discourse

While welcomed by many, the concept of science diplomacy has also received fundamental criticism. In this topic, we list the main points of critique: normative, imprecise, idealistic, instrumentalises scientists/science, optimistic, and sensationalist (N-I-I-I-O-S) together with the selected sources (Table 1).

Below you can find the list of references and more detailed lists of critique for the individual sources. All critical reflections have in common that they put the focus on *the concept of science diplomacy* and its use as a label. The critique is not concerned with the practices behind.

Table 1. **Main aspects of critiques to science diplomacy as a concept (NIIIOS)** Source: conceptualised by Rungius and Flink from different sources.

N Normative		
	- Originated in a strategic political situation - Use of the term geared by political aspirations - Not empirically substantiated - Normativity is often kept tacit though *"Definitions do not describe SD as it is in its diversity, but as it should be with regard to its missions considered as priorities."* (Ruffini, 2020) *"The lack of agreement over the meaning of SD allows various actors to use the term—which resonates neutrality of means and purposes—to push their individual agenda."* (Trobbiani and Hatenboer, 2019)	Ruffini 2020 Rungius and Flink 2020 Trobbiani and Hatenboer 2018 Penca 2018
I Imprecise		
	- A catch-all term - Concept is of small analytical and academic value - It creates problem of agency with regards to actors - It is in some aspects even contradictory (comprising even opposing interests; narrow - altruistic) *"Definitions should obviate ambiguity, and usually their essential components get clearly defined alongside, unless they are trivial or common sense. But neither science nor diplomacy can bear on common understandings."* (Flink, 2020) *"It is far from being stable and clearly defined. Instead, different understandings based on economic (competitive), political or scientific objectives create tensions for the coherence of the term."* (Trobbiani and Hatenboer, 2019)	Penca 2018 Trobbiani and Hatenboer 2018 Ruffini, 2020 Rungius and Flink 2020 Rungius *et al.* 2018
I Idealistic		
	- Benefits of science in the international arena largely based on universal values of science - Idea of universal values of science empirically and theoretically contested (highly romanticized image) - Epistemic context of scientific values disregarded (adaptation to political sphere is problematic) - Risks to raise high hopes that have no basis in fact *"Science serves as an allegory for the universal human motivation and pursuit of reason. Scientific disinterestedness is expected to act as a unifying point of orientation deliberately opposing competing national interests. Science is used emblematically for communism, universalism, and disinterestedness, but in a deeply political context: to counter what are considered the deficiencies of politics; divisiveness, opposition, and self-interestedness."* (Rungius and Flink, 2020) *"Science diplomacy promises to (re)install collaboration of actors and reason in international affairs. Amidst defective national egoistic policy-making, scientists and their advocates are portrayed as competent and altruistic saviours that help the world's society solve its grand challenges and overcome its looming threats."* (Flink, 2020)	Rungius and Flink 2020 Flink 2020 Rungius *et al*. 2018

I Instrumentalises scientists/science		
	- Instrumentalisation of science for particularistic purposes - Politicisation of science - Potentially hijacking apolitical efforts within science that contribute to international relations "Scientists or scientific organizations are meant to act as unselfish and therefore credible facilitators in politics. At the same time, however, they are not supposed to touch upon grand policy goals. [...] As congenial as this may sound, however, the discourse takes a role model for reality, and no matter what status, it would still remain highly presuppositional and conceptually problematic." (Rungius and Flink, 2020)	Trobbiani and Hatenboer 2018 Rungius and Flink 2020 Flink 2020 Penca 2018
O (Unduly) Optimistic		
	- talk-action discrepancy - emphasizes cooperation over competition - soft-selling of power dimension (soft and hard power) - does not reflect: scientific interests are not necessarily peaceful *"The missing reference to competition is the strongest manifestation of the gap that exists between the reality of SD and the way it is most often talked about"* (Ruffini, 2020)	Penca 2018 Flink 2020 Rungius and Flink 2020 Ruffini 2020
S Sensationalistic		
	- tied into the frame of global challenges/grand challenges - evoking a sense of urgency to act "The concept of science diplomacy is embedded in the narrative of a crisis, in fact a looming scenario in which the world is facing pressing and *existential* problems that do not only affect a single nation state anymore but the entire mankind. In the face of a threatening future, science diplomacy appears as a sensationally empowering vision." (Rungius and Flink, 2020)	Rungius and Flink 2020 Flink 2020
Caveats of criticism		
	- the discourse is marked more by realist conceptions today; has become more pragmatic - concepts help to make sense of the world regardless of how realistic/empirical they are	Ruffini 2020

An alternative way to deconstruct these critical reflections about science diplomacy is by focusing on each group of authors:

First, Jerneja Penca, from EL-CSID, raises the following concerns:

- The typology by the Royal Society and AAAS is built on a premise that international scientific relations are conducive to win-win situation, disregarding competitive aspects
- It is unrealistic to assign specific clear-cut cases to one single typology
- Typologies stays silent when it comes to the question of how exactly science cooperation translate into improved international relations
- Typology discounts the role of factors, other than the official policy and potentially hijacks those apolitical efforts

The author so states it in the following quote:

> *"... the character of ‚science diplomacy' is fuzzy. There remains a considerable scope for understanding the relevance of the discursive innovation of "science diplomacy". Is the concept identifying a novel practice and if so, what is it? If not, what is the reason for this new rhetoric? Fundamentally, what policy implications for the EU does this rhetoric generate?*" – Penca, 2018

Second, Tim Flink and Charlotte Rungius, from S4D4C, raise the following concerns:

- Science diplomacy is embedded in affirmative discourses of public engagement such as grand societal challenges, responsible research and innovation, transformative innovation, missions or anything that carries the buzzword "sustainability"
- It uses an idealised image of science that hardly matches with lifeworld realities, as science may also contain chauvinism, fierce competition, vanity and reputation games, misconduct and unsavoury entanglements with nefarious business and political interests
- There is a misinterpretation of scientific norms as a practical reality and incorrectly taking them at face value
- It is oxymoronic: the discourse holds that diplomacy should foster international collaborations of scientists to support their (allegedly) non-political interests of advancing knowledge, while at the same time its advocates want to instrumentalise scientists for political purposes
- The discourse is largely uncritical towards underlying assumptions

These aspects can be noted in the following quotes:

> *"That large parts of the discourse on science diplomacy sensationally portray scientists as unpolitical, cosmopolitan and truth-seeking collaborators, however, seems not naive but strategic. And yet, the question is whether such raised expectations, as provided by promoters of this discourse, are not greatly overdrawn — and what happens, if they get disappointed?"* – Flink, 2020

> *"The discourse misconceives ideals and norms for real and will therefore disappoint social expectations, and second, because science is likely to be instrumentalised for political purposes"* – Rungius and Flink, 2020

And third, Pierre-Bruno Ruffini, from InsSciDE, raises the following concerns:

- The concept of science diplomacy emphasizes too much on collaborative virtues of science
- National interests as drivers behind science diplomacy are often neglected (received more attention and open debate only recently as part of more realist conceptions)
- Power relations between countries are overshadowed; power aspect often not mentioned
- Intentions behind science diplomacy not necessarily peaceful (e.g. espionage, territory expansion)
- The rationale of competition in SD is underestimated
- idealistic rhetoric serves political purposes of action: to arm actors with a rhetoric magnifying the transformative power of SD
- Discourse is dominated by practitioners with academic background and strong belief in the virtues of science
- Science diplomacy advocates "are opinion leaders, influencers, actors or even activists of SD" with a high aspirations, e.g. commitment to improve the world order, less aware of pragmatic conditions on the grounds of scientific virtues
- Current conceptualizations do not serve academic interests and do not account for the complexity of the subject matter

This quote is quite illustrative:

> *"States may conduct strategies of SD that are strictly rooted to their national interest and aiming only at taking advantage over others, thus not contributing to the quest for a better world order, which is at odds with the prevailing vision of SD" - Ruffini 2020*

Read more from these critical examinations of the concept of science diplomacy:

- Flink, Tim. (2020): "The Sensationalist Discourse of Science Diplomacy: A Critical Reflection." *The Hague Journal of Diplomacy*, 15(3), 359-370 (Link).
- Penca, Jerneja (2018*)*: *The rhetoric of "science diplomacy": Innovation for the EU's Scientific cooperation?* The EL-CSID Project. Institute for European Studies. Working Paper 2018/16: 1–16.
- Ruffini, Pierre-Bruno (2020): "Conceptualizing science diplomacy in the practitioner-driven literature: a critical review." *Humanit Soc Sci Commun* 7, 124 (Link).
- Rungius, Charlotte, and Tim Flink (2020): "Romancing science for global solutions: on narratives and interpretative schemas of science diplomacy." *Humanit Soc Sci Commun* 7, 102 (Link).
- Rungius, Charlotte, Tim Flink, and Alexander Degelsegger-Márquez (2018): *State-of-the-art report: summarizing literature on science diplomacy cases and concepts*. Deliverable 2.2. S4D4C, Vienna
- Trobbiani, Ricardo, and Constant Hatenboer (2018): *The Future of EU Science Diplomacy: Conceptual and Strategic Reflections*. EL-CSID Policy Briefs, EL-CSID Policy Paper 2018/14. Brussels: Institute of European Studies (Link).

2.3.8. Can Science Diplomacy Tackle Societal Challenges?

As a matter of conclusion to all these conceptualisations of science diplomacy covered in the previous topics, and also to compared national approaches more focused on soft-power interests versus global/societal challenges/interests, our S4D4C research fellow Ewert J. Aukes elaborates this short essay for our readers:

Science diplomacy has successively been conceptualised as an instrument, mechanism or tool to further national interests in the world. If scrutinised like this, it figures as just another version of "diplomacies" – after cultural ("jazz") diplomacy, water diplomacy, public diplomacy etc. –positioned to reap benefits from, in this case, international scientific collaboration for a notion of domestic progress. However, another corner of the scientific literature indicates that using scientific-diplomatic activities to these ends may not get us further when it comes to addressing, let alone tackling, what has been termed "societal" challenges, such as the UN Sustainable Development Goals.

In a globalizing world, contemporary grand societal challenges have been observed to be increasingly difficult to address by traditional means (Haas 2016; Kuhlmann and Rip 2018; Beck 2009). Among others, foreign policy and governing in general have seen shifts from centralized, top-down modes to more networked forms with new actors both multi- and sub-national pushing onto the scene (Hocking 2016; Rhodes 2007). Such developments increase the complexity and, thus, the difficulty of policymaking on all levels. Additionally, national and international policy initiatives linked to, for example, reducing poverty, crime, health threats, greenhouse gas emission or biodiversity deterioration are losing out against national political, sometimes protectionist struggles, short-sighted businesses and self-centred interests.

But there is more at play than these complications in the organization of (foreign) policymaking. In his proposal for a cosmopolitan view on national interests, the German sociologist Ulrich Beck pinpoints the fundamental difference in nature of global policy problems and what has traditionally been framed as 'national interest'. He argues that short-sighted economic solutions, unjust social arrangements and exceeding planetary boundaries on the global scale, have created a kind of policy problem that cannot be viewed from the perspective of "pluralist rivalry of people and states" (Beck 2009, 173). Rather, these kinds of problems, which can roughly be equated with what we consider societal challenges to be, remove this rivalry and present us with a purpose that affects us all in a similar way and binds us together – no matter the country of origin. Thus, a science diplomacy that can not only address, but preferably also tackle, societal challenges without the competitive, sometimes conflictual rivalry of old needs to take a different approach.

If the nature of societal challenges renders a 'soft-power-oriented' approach purely focused on protectionist interests unsuitable and undesirable, a new wave of 'societal-challenge-oriented' science diplomacy must endorse a discourse of collaboration, transparency and reciprocity (Ruffini 2020; Young *et al*. 2020; Aukes *et al*. 2021). What is more, a societal-challenge-oriented science diplomacy, which to our understanding is inherently collaborative, will have a hard time flourishing in circumstances of strained or even dysfunctional international relations. Prima facie, this is simply a matter of consecutive development or reinterpretation over time. However, 'societal-challenge-oriented' science diplomacy actually represents a profoundly different approach to the

interactions of science and foreign policy. And these two visions of science diplomacy are difficult, if not impossible, to reconcile. In other words, in situations in which the collaborative 'logic' of science diplomacy is illogical (cf. Ruffini 2020), due to diverging value systems, interests and worldviews, societal challenges cannot be addressed through science diplomacy.

Read more

- Aukes, Ewert, James F. Wilsdon, Gonzalo Ordóñez-Matamoros, and Stefan Kuhlmann (2021): *Global resilience through knowledge-based cooperation: A New Protocol for Science Diplomacy*. S4D4C POLICY BRIEF, forthcoming February 2021.
- Beck, Ullrich (2009): *Macht und Gegenmacht im globalen Zeitalter: Neue weltpolitische Ökonomie.* Frankfurt am Main: Suhrkamp.
- Haas, P. M. (2016): Social Constructivism and the Evolution of Multilateral Environmental Governance. In P. M. Haas (Ed.), *Epistemic Communities, Constructivism, and International Environmental Politics* (pp. 121-149). London: Routledge.
- Hocking, Brian (2016): "Diplomacy and Foreign Policy." In *The SAGE Handbook of Diplomacy*, edited by Costas M. Constantinou, Pauline Kerr and Paul Sharp, 67-78. Los Angeles: Sage.
- Kuhlmann, Stefan, and Arie Rip (2018): "Next-Generation Innovation Policy and Grand Challenges." *Science and Public Policy* 45 (4): 1-7 (Link).
- Rhodes, Rod A.W. (2007): "Understanding Governance: Ten Years On." *Organization Studies* 28 (8): 1243-1264 (Link).
- Ruffini, Pierre-Bruno (2020): "Collaboration and Competition: The Twofold Logic of Science Diplomacy." *The Hague Journal of Diplomacy* 15 (3): 371-382 (Link).
- Young, Mitchell, Charlotte Rungius, Ewert J. Aukes, Lorenzo Melchor, Elke Dall, Eliška Černovská, Eliška Tomolová, Laure-Anne Plumhans, Pauline Ravinet, Tim Flink, and Ana Elorza Moreno. 2020. *The 'Matters' of Science Diplomacy: Transversal Analysis of the S4D4C Case Studies*. S4D4C (Vienna) (Link).

2.4 What Kind of Science Diplomats Are There?

This lesson aims to provide real examples of science diplomats, their responsibilities and required set of skills (i.e. diplomats, science attaché, chief science adviser, and others).

Science diplomacy takes place in a variety of contexts. The formalised science diplomacy positions at embassy-level (e.g. by attachés and counsellors) usually have a well-defined profile. However, there is considerable variation between countries and their institutions in how individuals get recruited to become science diplomats, how their career paths are and can be shaped and what political relevance is attributed to their specific subject area etc. (Degelsegger-Martínez *et al*., 2018; Melchor, 2020).

We can divide the types of science diplomats in the following two main categories:

- **Institutionalised positions**: science attachés, science advisors, research councils' and public research organisations' representatives deployed abroad, etc. who either have a formal science diplomacy mandate and/or who actively bring science policy and foreign policy together in their daily job.
  These profiles will be covered in topics **2.4.1 Diplomats**, **2.4.2 Chief science advisers**, and **2.4.3 Science counsellors, attachés, advisers and envoys in embassies**.

- **Non-institutionalised positions**: scientists; managers and administrators of agencies or research organisations with no formal science diplomacy mandate; civil society representatives (facilitators of science diplomacy, etc.), who may even only sometimes be engaging in international projects liaising with government officials and multilateral organisations
  These profiles will be covered in topics **2.4.4 The activist researcher – The organic science diplomat**, and **2.4.5 Other profiles**.

Type	Workplace	Positions
Institutionalised positions	Embassies National embassies abroad or foreign embassies at home country, and/or national representation in international organisations and large research infrastructures	Science counsellors and attachés Innovation attachés/ delegates Science envoys Diplomatic envoys Liaison officers Tech ambassadors
	Ministries Government departments and other public agencies with an international scope and/or international organisations	Special ambassadors for science diplomacy Chief science advisers Civil servants, officers, and managers
Non-institutionalised positions	Research centres, universities, non-governmental organisations, learned societies, and government departments and public agencies with no science diplomacy mandate	Researchers in academia/ industry Policy scientists, science managers and consultants

Table 2. The science diplomat taxonomy. Source: extracted from (Melchor, 2020).

One needs to consider that there is no straightforward path to become a science diplomat, something that you will notice during the following topics and interviews to experts. Increasingly, however, there are formal and informal training programmes that provide professionals with the required knowledge and skillset (see **Module 6**) to perform in the science-diplomacy interface (Mauduit and Gual Soler 2020). The table below shows just some examples.

Name of the course	Organisation
AAAS-TWAS Summer Course on Science Diplomacy	The American Association for the Advancement of Science (AAAS) and The World Academy of Sciences (TWAS)
Science and Technology Diplomacy Summer School	SciTech DiploHub
Master in Science, Technology, Engineering and Public Policy (STEaPP)	University College London (UCL)
Master of Science in Environmental Technology & International Affairs (ETIA)	Diplomatische Akademie Wien – Vienna School of International Studies

Individuals "Matter" in the Transversal Analysis of S4D4C Case Studies

S4D4C has found that individuals matter profoundly for science diplomacy as creative and responsible actors within their respective professional realms, even though they may not identify themselves as "science diplomats".

Working in the science diplomacy interface often requires individuals to define their roles, tasks and professional identities themselves, relying a lot on their formalised/institutionalised or personal networks, previous positions and affiliations, and their wide array of transboundary skills (creativity, initiative, advocacy, trust-building, and so forth). The cases of cybersecurity and water diplomacy illustrate the influence of individuals.

Political leadership as well as institutional affiliations and traditional professional identities all influence the effect of an individual operating in science diplomacy. Projects such as SESAME have greatly benefited by the efforts and leadership of individual champions able to bring scientific credibility at the same time that brokering political and diplomatic support. The success of science diplomacy initiatives depended strongly on the promotion and advocacy of individuals standing behind these efforts.

There is thus range for an individual to wear hats from both established communities (the scientific and the diplomatic), with them pro-actively identifying themselves as "science diplomats" to create new forms of political intervention.

More about "Individuals 'matter'" can be found in (Rungius and Melchor 2020).

What the experts think

The experts below provide an overview of these different positions, which will be fully expanded upon in the topics that follow.

Tom Wang

Expert in Science, Technology and International Relations. Former Chief International Officer of the American Association for the Advancement of Science (AAAS)

Can you give us a few examples of jobs a science diplomat may have?

Video Link to YouTube

Lorenzo Melchor

EU Science advice and diplomacy officer, Spanish Foundation for Science and Technology (FECYT). Former science adviser in the Spanish embassy in London

Can you give us a few examples of jobs a science diplomat may have?

Video Link to YouTube

Read more about different profiles of science diplomats here:

- Degelsegger-Márquez, Alexander; Tim Flink, and Charlotte Rungius (2018): *What it takes to do science diplomacy. Practices, identities, needs and challenges of science diplomacy practitioners. Baseline analysis and needs assessment*, Deliverable 2.3, Vienna: S4D4C (Link).
- Mauduit, J-C, and Marga Gual Soler (2020): "Building a Science Diplomacy Curriculum." *Front. Educ* 5:138 (Link).
- Melchor, Lorenzo (2020): "What Is a Science Diplomat." *The Hague Journal of Diplomacy* 15 (3):409-423 (Link).
- Rungius, Charlotte, and Lorenzo Melchor (2020): Individuals. In: Mitchell Young, Charlotte Rungius, Ewert Aukes, Lorenzo Melchor, Elke Dall, liška Černovská, Eliška Tomolová, Laure-Anne Plumhans, Pauline Ravinet, Tim Flink, and Ana Elorza Moreno. *The 'Matters' of Science Diplomacy: Transversal Analysis of the S4D4C Case Studies*. S4D4C Policy Report. S4D4C: Vienna. pp:20-23

2.4.1 Diplomats

What is a diplomat?

Diplomats are a type of public servant that either belong to the diplomatic career or are political appointees. Diplomats can be deployed either to another nation state to foster bilateral collaborations or to international organizations to defend national interests in the multilateral environment. Likewise, diplomats may represent a nation state or an intergovernmental institution such as the United Nations or the European Union.

Their main functions are:

- Representation and protection of the interests and nationals of the sending state
- Initiation and facilitation of strategic agreements
- Participation in the design of treaties or conventions
- Mediators of international relationships in the fields of trade, commerce, technology, culture, science, etc.
- Providers of stable channels of communication

Their actions are covered by the Vienna Convention on Diplomatic Relations (1961) (See Link). They usually have diplomatic immunity and use a diplomatic passport for their official travels.

Regardless of the country, they belong to one of the eldest civil servant corps, but depending on the country, they have different requirements to become a diplomat and then distinct career levels, years for each deployment (either abroad or within the Foreign Affairs Department in the national headquarters), etc.

Profiles of diplomats in science diplomacy

More and more, diplomats are considering science, technology, and innovation as fundamental parts of their foreign policy agenda. Diplomats can thus be appointed as:

- **Special ambassadors or envoys for science diplomacy**: This role raises the importance of science diplomacy within the ministerial department and their main function will be that of coordinating all science diplomacy officers deployed abroad and within the ministry

- **Foreign Affairs Ministry's headquarters officers**: Diplomats may belong to specific government department units in the national headquarters that are in charge of scientific affairs. For instance, Spain has a Directorate for Culture and Scientific Relations within a public agency dependent on the Ministry for Foreign Affairs, Cooperation and European Union, and it coordinates all cultural and scientific counsellors abroad. Although it does not have the same political value as the special ambassadors stated above, this approach incorporates an anchoring to the administrative landscape that would survive different political contexts.

- **Scientific counsellors**: Some countries such as Austria or Switzerland appoint diplomats as scientific counsellors in their embassies abroad. These diplomats by training have a portfolio of science, technology and innovation and strive to improve bilateral and multilateral scientific collaboration between their countries and their host destinations.

- **Tech ambassadors**: The growing importance of tech cities, start-ups, and tech giants in the global economy as well as in international affairs has made certain countries to deploy diplomats to technology hubs as tech ambassadors. For instance, Denmark appointed a diplomat to Silicon Valley to oversee The Office of Denmark's Tech Ambassador as part of its global *Techplomacy* strategy (Klynge, Ekman and Waedegaard 2020). In general, tech ambassadors help countries to enhance their relationships with these stakeholders and oversee the global development of tech affairs (cybersecurity, big data, etc.) (Melchor 2020).

- **Special envoys to international organisations and large research infrastructures**: Nation states that participate in international organisations (such as the Union for the Mediterranean) and large research infrastructures (such as CERN) usually have two delegates in the governing body of these institutions. One delegate represents their government's administration, the other represents national scientific interests. The former tends to be the diplomat who would be key in reaching negotiation and defending national political interests, whereas the latter tends to be a scientist who provides technical expertise and advice as well as a better understanding of the national scientific landscape and interests.

What the experts think

<table>
<tr><td rowspan="2">  </td><td>Cristina Fraile
Deputy Chief of Mission at the Embassy of Spain in Washington</td></tr>
<tr><td>What are the competences and skills a good diplomat needs to have in order to embed themselves in a big Embassy as the Spanish one in the US?
Video Link to YouTube</td></tr>
</table>

	**Susanne Keppler-Schlesinger** Deputy Director of the Diplomatische Akademie Wien – Vienna School of International Studies
	What skills do you require to work as a diplomat? What skills are required in science diplomacy? Video Link to YouTube

	**Miguel Garcia-Herráiz Roobaert** Deputy Directorate General for EU External Relations and Trade, Secretariat of State for EU Affairs, Spanish Ministry for Foreign Affairs, European Union, and Cooperation
	What is your background and current position? What are your main responsibilities? Video Link to YouTube

Read more!

- Melchor, Lorenzo (2020): "What Is a Science Diplomat." *The Hague Journal of Diplomacy* 15 (3):409-423 (Link).
- Klynge, Casper, Mikael Ekman, and Nikolaj Juncher Waedergaard (2020): "Diplomacy in the Digital Age: Lessons from Denmark's TechPlomacy Initiative." *The Hague Journal of Diplomacy*, 15(1-2), 185-195 (Link).

2.4.2 Chief Science Advisers

What is a chief science adviser?

Chief science advisers (CSA) aim to bridge the realms of science and policy. Science advice to government is a practice that goes back to C. P. Snow's (1961) analysis on science and government, which covers two eminent scientists advising the British government in the Second World War. Science and policy are two realms where the role of a science adviser is that of mobilizing knowledge to influence in a rationalized policy-making process (Jasanoff, 1994; Weingart, 1999).

There is no "one size fits all". Depending on the country, you may find different informal or formal channels for science advice to governments. The US appointed its first presidential science advisor in 1957, followed seven years later by the appointment of the first cross-government Chief Scientific Advisor (CSA) in the UK. CSAs have also been appointed in Australia, Cuba, Czech Republic, India, Ireland, Malaysia, New Zealand and at the European Commission. In the UK, additional SA roles have been added gradually since 2002, and there is now one in every government department (DSAs). New Zealand is also adopting a DSA model (Wilsdon, 2014).

The two main models are thus as follows:

- **Single individuals** who are appointed to advise the Prime Minister alone (United States, Canada, New Zealand, etc.) or the Prime Minister and/or each governmental minister. The latter ones can be seen in the United Kingdom with the Government for Science office (GO-Science), where all Government CSAs who provide advice to each secretary of state and minister gather together to coordinate their actions and exchange best practices. This model of single individuals is usually found in the Anglo-Saxon countries.

- **Institutionalized or ad-hoc expert committees** are established to provide science advice to Government. These may comprise advisory councils, advisory committees or even the role of academies, learned societies and scientific networks (Wilsdon, 2014). The European Union with the Science Advice Mechanism (SAM), a group of seven renowned experts that give advice to the European Commission as a whole, is a valid example. Indeed SAM was an evolution from the single individual model that had Scottish Dame Prof Anne Glover appointed as CSA between 2011-2015.

Regardless of the formula, CSAs tend to be active scientists who work in either a secondment or part-time framework embedded within a government department.

Chief science advisers and science diplomacy

Those CSAs that provide their advice to foreign ministries are the ones more directly involved in science diplomacy, international scientific cooperation and international relations. They are not necessarily experts on all scientific matters but understand where to find the most appropriate expert on any given topic. Their role would entail:

1. serving as evidence brokers in the increasingly transboundary world with emerging complexities,
2. revealing options to informed decision-making by nations across the international landscape, and
3. co-coordinating the network of science counsellors, attachés or advisers abroad. This is the case for the UK, where the CSA to the Foreign Commonwealth Office soft-coordinates the delegates of SIN network.

Having said this, providing international science advice is a difficult practice with challenges and checklists to fulfil and strict protocols to be established (Grimes *et al.*, 2017). These science advisers to the Foreign Ministries have established a network called FMSTAN, which is covered in Module **3.3.4. Global Networks**.

The specific skillset required for CSAs is broad. Not only do they have to recognise the limits of science, accept that they inform and do not make policy themselves (Gluckman, 2014), but also they need to adopt and feel comfortable with the role of a broker (Pielke, 2007), not of an advocate. They need to embody credibility as well as the trust of the public, media, policymakers, politicians, diplomats and scientists, being able to actively engage with all these communities and provide spaces for mutual understanding and respect. Lastly, transparency and independence are also traits that any CSA needs to fulfil their role.

Different CSA to Foreign Affairs Ministries have reported the main factors for being successful as CSA in Foreign Ministries (Gluckman *et al.*, 2017): (1) collaboration

throughout government is key as CSA from the foreign ministry engages with other officials in other government departments; (2) communication and support within the foreign ministry will enable the CSA to better interact, understand the particular country position and priorities, and advice different officials; (3) active relationship to the science community will enable the CSA to inspire confidence within the scientific community, the civil service and industry; and (4) access to Science and Technology teams that will support the CSA in any activity that may not be of her expertise or will expand her influence in the global scene with the help of the national network of science attachés.

What the experts think

Here, we bring you the comments from different renowned Chief Scientific Advisers so you get to better understand not only their scientific careers, but also their role and commitment to ensure science has a say in the policy-making process.

	**Peter Gluckman** Chair of the International Network for Government Science Advice (INGSA) and former Chief Scientific Advisor to the Prime Minister of New Zealand (2009-2018)
	What is your background? When did you become a science diplomat? Video Link to YouTube

	**Robin Grimes** Chief Scientific Adviser (CSA) to the UK Ministry of Defence on nuclear science and technology matters. Former CSA to the UK Foreign and Commonwealth Office (FCO). Professor of Materials Physics at Imperial College London
	Can you tell us very briefly what is your background and the main milestones of your career? Video Link to YouTube

	**Mona Nemer** Chief Science Advisor to Canada's Prime Minister and Minister of Science
	Could you tell us briefly about your background and current position? What are your main responsibilities as CSA? Video Link to YouTube

Read more!

Part of the information contained in this topic has been extracted from some of the following documents.

You may also read additional information in the links below:

- Clary, David C. (2013): "A Scientist in the Foreign Office." *Science & Diplomacy*, Vol. 2, No. 3 (September 2013) (Link).
- Degelsegger-Márquez, Alexander, Tim Flink, and Charlotte Rungius (2018): *What it takes to do science diplomacy. Practices, identities, needs and challenges of science diplomacy practitioners. Baseline analysis and needs assessment*, Deliverable 2.3, Vienna: S4D4C (Link).
- Gluckman, Peter (2014): "The art of science advice to government." *Nature*, 507, 163–165.
- Gluckman, P.D., V. Turekian, R. W. Grimes, and T. Kishi (2017): "Science Diplomacy: A Pragmatic Perspective from the Inside." *Science Diplomacy*, Vol. 6, No. 4 (December 2017) (Link).
- Grimes, Robin W, Julie K. Maxton, and Ruth E. Williams (2017): "Providing International Science Advice: Challenges and Checklists." *Science & Diplomacy* Vol. 6, No. 3 (September 2017) (Link).
- Jasanoff, Sheila (1994): *The Fifth Branch: Science Advisers as Policymakers*, Boston: Harvard University Press.
- Melchor, Lorenzo (2020): "What Is a Science Diplomat?" *The Hague Journal of Diplomacy* 15 (3):409-423 (Link).
- Pielke, Roger (2007): *The Honest Broker: Making Sense of Science in Policy and Politics*, Cambridge: Cambridge University Press.
- Snow, Charley P. (1961): *Science and Government*, Cambridge: Harvard University Press.
- Weingart, Peter (1999). "Scientific expertise and political accountability: paradoxes of science in politics." *Science and Public Policy* 26(3): 151-161.
- Wilsdon, James (2014): "The past, present and future of the Chief Scientific Advisor." *European Journal of Risk Regulation*, 2014 (3). pp. 293-299 (Link).

Examples of CSA

- Network of Chief Scientific Advisers to the United Kingdom (Link).
- Principles of scientific advice to government, 2010 (Link).
- SAM - Group of Chief Scientific Advisors to the European Commission (Link).
- Sato, Y; and T. Arimoto (2016): "Five years after Fukushima: scientific advice in Japan". *Palgrave Communications* 2, 16025 (Link).

2.4.3 Science Counsellors, Attachés, Advisers, and Envoys in Embassies

Scientists working in embassies

Scientists may be deployed from their home institutions (ministries, research centres, universities…) to embassies, or be locally hired in embassies. These professionals have responsibility to liaise on science, research, technology, and innovation issues. Their job titles greatly vary, such as: science counsellors (France), science attachés (US), science advisers or coordinators (Spain), science envoys (also the US), or science wings (India).

The literature on the history and profile of science attachés goes back to the 1950s (Loftness, 1955; Forbes, 1957). The first US science attaché in Sweden was Robert L. Loftness, who justified the role of science attachés in a list of different reasons, including building up scientific international collaborations between research teams in both countries (Loftness, 1955). William H. Forbes also pointed out science attachés could help the US to ensure its world leadership but, above all, to improve the US moral and ideological image before other countries (Forbes, 1957).

Science counsellors or attachés usually should have scientific legitimacy to better engage with the scientific community, but these roles are sometimes filled up by diplomats who require specific scientific training (see Topic **2.4.1. Diplomats**). In fact, the US switched to a science attaché model where the diplomat is the one delivering this task. On the

other hand, France would be the paramount example in appointing active scientists as science counsellors abroad in their Offices of Science and Technology where they also receive science attachés sent from French research institutions and locally-hired expert staff, who are all under the supervision and management of the science counsellor.

However, few renowned scientists can and want to serve full-time as science counsellors/attachés, especially if this implies working with the intelligence community or if it requires foreign language skills. This is why additional professional figures are engaged. Some countries use:

- Locally-hired experts with a scientific background who would like to specialize in policy-management, such as the UK-SIN model or France that hires local professionals with a scientific background to fill up their staff in their Science and Technology Offices abroad.

- Appointment of science envoys who would spare just a few days a year to engage internationally. For example, the case of President Obama appointing three Science Envoys to Muslim-majority countries to improve the US image in these countries by fostering international scientific cooperation: Bruce Alberts, former president of the U.S. National Academy of Sciences; Ahmed Zewail, Nobel Laureate and professor at the California Institute of Technology; and Elias Zerhouni, former director of the U.S. National Institutes of Health (El-Baz, 2010).

- Lastly, besides scientists or diplomats being appointed to these science delegate roles in embassies, governments may also send civil servants from their governmental departments who may not necessarily have a scientific background.

Functions of science counsellors/attachés

At embassies, these different scientific profiles have the following missions (Ruffini, 2017):

1. **Collecting and analysing information**. The identification and analysis of scientific advances, and the research, development and innovation strategies of all stakeholders in the country of residence, are both fundamental in the science counsellor's portfolio. This information will need careful reporting to their ministries, research centres, innovation structures and enterprises in his country of origin.

2. **Facilitating contacts between scientific communities of both countries**. The science counsellor promotes scientific mobility of PhD students and postdoctoral researchers, as well as the establishment of close scientific collaborations and partnerships between scientists of both countries. Sometimes, their efforts may be focused on specific scientific areas of interest according to national plans of research and development or the pre-existence of bilateral networks.

3. **Promoting intellectual productions originating from his country and enhancing its scientific and technological image**. Through the organisation of events, seminars and conferences, the science counsellor would invite leading

researchers and institutions of her home country to showcase their research activities abroad.

4. **Organising the reception of official delegations**. The science counsellor prepares and supports visits of ministries, government officials and executives of research institutes to the other country. They also facilitate communication between the government authorities in charge of research and innovation in both countries.

5. **Delivering a scientific advisory role**. A growing trend is to enhance the role of the science counsellor/attaché in both providing science advice to all Foreign Service staff deployed in the embassy and encouraging scientific and technical exchanges in different departments. With the growing importance of scientific issues such as global warming, cybersecurity, bioterrorism, global infectious diseases, their role in foreign policymaking and diplomacy is becoming more important.

What the experts think

Below is the testimony of a number of science diplomacy professionals. First, a scientist who moved to international affairs appointed by her government to the French Embassy in Washington DC. After this interview, two advisers working at the Ministry for Foreign Affairs or at an embassy will give you a glimpse into the varied role of the science adviser. In the last interview, our expert explains the role of an Italian science attaché in South Africa. There are other science attachés who will give you more information about their role in **3.2.1. Types of science diplomacy stakeholders: Governmental stakeholders** and **3.3.2. Types of science diplomacy networks: National networks**.

	**Minh-Hà Pham** Vice-President for International Relations, Université Paris Sciences et Lettres – PSL (PSL) and former Science Counsellor in the Embassy of France in Washington DC
	What is your background? Video Link to YouTube

	**Niccolo Iorno** Swiss Federal Department of Foreign Affairs (FDFA)
	Can you tell us briefly about your background and your main milestones in your career? Video Link to YouTube

	**Lorenzo Melchor**

	EU Science advice and diplomacy officer, Spanish Foundation for Science and Technology FECYT). Former science adviser in the Spanish embassy in London
	What was your role at the Embassy of Spain in London? Video Link to YouTube

	**Peter McGrath** Coordinator of the Science Diplomacy Programme in The World Academy of Sciences (TWAS)
	Can you give us a few examples of jobs a science diplomat may have? Video Link to YouTube

Read more!

Part of the information contained in this topic has been extracted from the following documents:

- Degelsegger-Márquez, Alexander, Tim Flink, and Charlotte Rungius (2018): *What it takes to do science diplomacy. Practices, identities, needs and challenges of science diplomacy practitioners. Baseline analysis and needs assessment*, Deliverable 2.3, Vienna: S4D4C (Link).
- El-Baz, Farouk (2010): "Science Attachés in Embassies." *Science* Vol. 329, Issue 5987, pp. 13. DOI: 10.1126/science.1189621 (Link).
- Flink, Tim, and Ulrich Schreiterer (2010): "Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches." *Science and Public Policy*, 37(9), November 2010, pages 665–677. DOI: 10.3152/030234210X12778118264530 (Link).
- Forbes, William H. (1957):" The Role of Science Attachés." *Bulletin of the Atomic Scientists*, 13(8), 274-276.
- Loftness, Robert L (1995): "Why Science Attachés?" *The Scientific Monthly* Vol. 80, No. 2 (Feb., 1955), pp. 124-127 (Link).
- Melchor, Lorenzo (2020): "What Is a Science Diplomat?" *The Hague Journal of Diplomacy* 15 (3):409-423 (Link).
- Ruffini, Pierre-Bruno (2017): *Science and Diplomacy. A New Dimension of International Relations. Science, Technology and Innovation Studies*. Cham: Springer International Publishing (Link).

2.4.4 The Activist Researcher – The Organic Science Diplomat

In the last two topics we have covered the role of scientists working part-time or full-time in any job directly related to science diplomacy. However, scientists who work full-time in academia performing their research duties can actively engage with members of the general public, policy-makers and diplomats to make their knowledge and research results have a direct impact on society, public policies, or international relations. These are active and activist researchers who engage, either on an individual level or via any expert advisory committee or both, in public or policy discussions to make science present outside the traditional academic ivory tower.

This endeavour may be more difficult to undertake when the scientist is involved in basic or blue-sky research, as transferring their research into a direct policy application may be indeed a challenge. However, these scientists could provide other transferable skills to

the public discussion that would be of great social benefit such as critical thinking, the scientific method, an open-minded approach, or their usual ability to build up international collaborations and partnerships.

Having said this, scientists who are directly involved in doing research that can be fitted into any of the 17 Sustainable Developmental Goals (SDGs) will likely have many opportunities to interact with policy-makers, politicians, diplomats and national and international government organisations, as well as with media and/or industry. Traditional examples of these figures would be the role played by many scientists to contribute to an understanding of the ozone problem or the active advisory role of scientists included in the International Panel for Climate Change (Moomaw, 2018).

Regardless of their scientific expertise, these scientists embody a special category of scientists that we will call here **the organic science diplomat researcher**. Although they may not recognise their actions as science diplomacy, and their daily routine belongs to an academic one, they also need to be considered here as active agents of science diplomacy.

It is also important to note the growing trend from governments and public research funding agencies to not only implement policies that make scientists more involved in public debate and society, but also to recognise these actions as fundamental parts of their research outputs. Some policies are listed below:

- **Responsible Research and Innovation (RRI):** Implemented by the European Commission as a cross-cutting issue in Horizon 2020. RRI is a wide concept that spans from involving society in science and innovation processes to all kinds of relationships between research and innovation with society (public engagement, open access, gender equality, science education, ethics, and governance). RRI entails engaging all kind of actors through inclusive and participatory methodologies in all stages of Research and Innovation processes and governance, providing potential solutions for grand societal challenges. One of the mechanisms put forward is the "Science with and for society (SWafS) programme" that aims to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility See link in the box below for further information.
- **Open innovation, open science and open to the world**: These are the three main policy goals for EU research and innovation set by European Commissioner Carlos Moedas in 2015. The one particularly related to science diplomacy would be „Open to the World" that means promoting international cooperation and allowing Europe to access the latest knowledge worldwide, recruit the best talent, tackle global challenges and create business opportunities in emerging markets. See link in the box below for further information.

All in all, the trend points to the need for active engagement between citizens, scientists and policy makers in a public dialogue about the benefits and risks associated with research, but also the need for scientists to provide the latest scientific evidence for better policy-making processes. The idea is to establish and maintain citizens' confidence in science and technology, to make these more participatory, and also reinforce democracy with better-informed policies and increased public trust (See Dudnik, 2017; Holford, 2018; Nature, 2019; to get an idea of this global trend).

What the experts think

Watch the videos below to understand how broad a science diplomat can be. As a full-time researcher, one may engage in international discussions with national governments and multilateral organisations around topics such as nuclear diplomacy, water diplomacy, health diplomacy, etc. all of which may be covered by the umbrella term "science diplomacy".

	**Izaskun Lacunza** Head of the International Projects Unit, Spanish Foundation for Science and Technology (FECYT)
	How should the scientific community be more involved in science diplomacy? Video Link to YouTube

	**Marga Gual Soler** Senior project director in the Center for Science Diplomacy at the American Association for Advancement of Science (AAAS)
	What are the skills and competences a science diplomat should have? Can you give us some example of jobs? Video Link to YouTube

Read more!

- Dudnik, Nina (2017): "Why Scientists Should All Be Diplomats." *Time*, 22 April. Available on: https://time.com/4750864/science-funding-diplomacy/.
- Holford, Mandë (2018): "Diplomacy for Scientists." *Scientific American*, 4 January. Available on: https://blogs.scientificamerican.com/observations/diplomacy-for-scientists/.
- Moomaw, William R (2018): "Scientist Diplomats or Diplomat Scientists: Who Makes Science Diplomacy Effective?" *Global Policy* Vol 9, Suppl 3, November, pp 78-80. https://onlinelibrary.wiley.com/doi/epdf/10.1111/1758-5899.12520.
- Nature Editorial (2019): "Scientists must rise above politics — and restate their value to society." *Nature* 572, 153. Available on: https://www.nature.com/articles/d41586-019-02379-w.
- Responsible Research and Innovation. https://www.rri-tools.eu/about-rri.
- Science with and for society (SwafS). https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society and https://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=ethics.
- Open innovation, open science and open to the world. Open innovation, open science, open to the world - Publications Office of the EU (europa.eu)

2.4.5 Other Profiles

Other non-institutionalised science diplomacy positions besides the organic science diplomat researcher have mostly to do with management and consultancy expertise. These roles will not have science diplomacy activities in their portfolio as such, but still have a clear international scope that from time to time may make them be engaged with

researchers, policy-makers, government officials and multilateral organisations around topics related to the broad term "science diplomacy".

Some of these roles receive the following names:

- **Policy scientists, science-policy managers, policy-makers, policy entrepreneurs**, who work in governmental departments to shape and deliver specific policies. They come from different backgrounds and in some cases have a previous scientific academic career. They may also work as expert consultants advising governments.

- **International Relationship Officers, Head of International Office, Director of International Affairs, etc**. These are professionals in research centres, universities, companies, consultancy firms, NGOs, learned societies, etc. that are directly in charge of international projects and building up international partnerships. If in a scientific institution, they will likely be more engaged with international scientific cooperation activities building up joint research projects, making bilateral agreements with other centres for student and staff mobility, seeking new international funding sources that may be harnessed with international partners, etc. In some occasions, they engage with government officials, embassy staff and multilateral organisations for specific projects, to network and to get additional support for their main activities abroad.

- **Institutional Relationship Officers, Head/Director of Institutional Affairs, Manager of Public Affairs, Head of Policy Affairs, etc.** These are professionals in research centres, universities, companies, consultancy firms, NGOs, learned societies, etc. that are directly involved in liaising with government representatives from all levels of government, members of parliament, regulatory agencies, media, learned societies and professional associations, etc. These are experts in influencing policy-making and regulatory processes by providing facts of interest for their institution, raising its profile in the public debate, and building trust with all stakeholders involved. As in the previous role, they may engage with science diplomacy stakeholders on specific projects.

What the experts think

You may learn from the expert below an overview of a job position for a science manager in international affairs.

Minh-Hà Pham

Vice-President for International Relations, Université Paris Sciences et Lettres – PSL (PSL) and former Science Counsellor in the Embassy of France in Washington DC

	What is your current position and what are your main responsibilities? Video Link to YouTube

Read more!

- Melchor, Lorenzo (2020): "What Is a Science Diplomat?" *The Hague Journal of Diplomacy* 15 (3):409-423 (Link).

2.5 Question Time

2.5.1 Brainstorming Questions

These questions are posed for you to reflect individually about the main messages put by our experts in science diplomacy. Please, take some time to think about them.

- Science diplomacy is a practice that is understood in different ways by different professionals or countries. What would be your definition?

- How would you describe the establishment of a large research infrastructure in a region traditionally in conflict, using the different conceptual frameworks about science diplomacy here presented?

- What special training could a scientist or a diplomat undergo to engage in science diplomacy actions?

- There is no "one size that fits all". Institutionally, science diplomacy positions vary between countries. Could you reflect on how your country structures their science diplomacy responsibilities between or within any of their scientific or foreign-affairs governmental departments?