USING SCIENCE FOR/IN DIPLOMACY
FOR ADDRESSING GLOBAL CHALLENGES

S4D4C EUROPEAN SCIENCE DIPLOMACY ONLINE COURSE

MODULE 6

What Set of Skills Do I Need to Be a Good Science Diplomat?

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The World Academy of Sciences (TWAS)

Different information sources

compiled by the German Aerospace Centre (DLR)

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Practical information

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USING SCIENCE FOR/IN DIPLOMACY FOR ADDRESSING GLOBAL CHALLENGES

S4D4C EUROPEAN SCIENCE DIPLOMACY ONLINE COURSE MODULE 6 – What Set of Skills Do I Need to Be a Good Science Diplomat?

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6.1 Learning Objectives and Preliminary Experts' Insights

What is a science diplomat? What science diplomacy roles formally exist? Who can become a science diplomat? Partly, these questions were already answered in *Lesson 2.4 What Kind of Science Diplomats Are There?*, but now we will focus on the knowledge, skills and competences to be effective in science diplomacy. It will help you reflect on your own skills, identify those you need to develop or improve, and provide you with tools and resources from the S4D4C project and external partners to explore further after you complete this module.

Learning objectives

In this module you will learn:

- the most valuable skills for science diplomats
- the importance of negotiation, communication, networking and other leadership skills for science diplomacy
- how to communicate complex scientific information in a way that is useful for policymakers
- how to build a science diplomacy training curriculum or programme

What the experts think

To begin identifying what skills are useful for a science diplomat, we have asked the experts. Listen to them in the videos below:

	**Tom Wang** Expert in Science, Technology and International Relations. Former Chief International Officer of the American Association for the Advancement of Science (AAAS)
	What are the competences and skills required to be a good science diplomat? Video Link to YouTube
	**Sara Cebrián** UK Science and Innovation Network Delegate in Spain & Portugal, British Embassy in Madrid
	What competences and skills are necessary to be a good science diplomat? 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 are the skills and competences a science diplomat should have? Video Link to YouTube
	**Peter McGrath** The World Academy of Sciences
	What are the skills and competences the science diplomat should have? Video Link to YouTube
	**Nadia Meyer** Project Manager at the German Aerospace Centre (DLR)
	What are the skills and competences the science diplomat should have? Video Link to YouTube

Questions to reflect on after watching the videos

Reflect on the main messages by our science diplomacy experts

From your own point of view (your country, sector, discipline, organisation), which are the most important skills for science diplomats?

- Do you think the skills of a science diplomat differ from the skills needed to be a scientist or a diplomat?
- Are there any 'transferable skills' from science to diplomacy, and vice versa?
- From those skills mentioned in the videos, what do you already have? What could you improve?

6.1.1 Challenges in Science Diplomacy Training

The first organisation to offer **training in science diplomacy** was the American Association for the Advancement of Science (AAAS) through their Center for Science Diplomacy, which aims to build the educational structures, curriculum and resources to support the next generation of science diplomacy leaders and ensure that scientists and diplomats have the tools and skillset to work at the intersection of science and international relations. AAAS has partnered with The World Academy of Sciences (TWAS) since 2011 to

organise a week-long summer course at TWAS headquarters in Trieste, Italy, to introduce science diplomacy to professionals from the global south and explore international policy issues relating to science, technology, environment and health. Many organisations around the world have adopted the curriculum and methodology of the AAAS-TWAS science diplomacy courses in their own training programmes. Indeed, training in science diplomacy has flourished over the last 5 years: S4D4C training workshops, InsSciDE Online Summer School, Barcelona SciTech DiploHub Summer School, or the São Paulo School on Science and Innovation Diplomacy (InnSciDSP), are some examples.

In this module we will introduce you to some of the resources, tools and materials from these training activities.

Before we begin, we must once again recognise that there is **no one definition or profile of a science diplomat**. Putting science diplomacy into practice requires the participation of professionals who perform a variety of functions that often do not fit with traditional careers in science or international relations. Since the scientific and diplomatic communities have traditionally been isolated from one another both educationally and professionally, the knowledge, skills and capacities of its professionals are not yet fully defined, nor is there an institutionalized curriculum or career path.

The broad set of skills of a science diplomat include communication to different stakeholders, negotiation, project management, intercultural competence and sensitivity, building and nurturing networks, storytelling, languages, following protocol, and much more. In practice, science diplomacy encompasses a spectrum of roles and organisational configurations and describes professionals who perform a range of activities and practices, from promoting international cooperation in science from an embassy, to providing scientific advice to a foreign minister, negotiating a multilateral agreement, or navigating scientific collaborations between countries under political strain, as we have seen in *Lesson 2.4. What Kind of Science Diplomats Are There?*

In this module we will explore what scientists should know about diplomacy (and vice versa), what skills should scientists and diplomats hone in order to work together, and what skills each community can learn from the other to bridge the divide between these two worlds.

6.1.2 Science and Diplomacy: Two Different Worlds?

The worlds of science and diplomacy might seem opposite at first, as introduced in *Lesson 2.2. The Worlds of Science and Diplomacy*. As former Canadian diplomat Daryl Copeland describes in his book *Guerrilla Diplomacy: Rethinking International Relations,* while science is of universal value and applicability, its culture and methods based in open discussions, challenging others, transparency, experimentation and risk-taking; diplomacy is about following protocol, maintaining stability, balancing power, negotiating and influencing others, all while operating in a highly hierarchical structure, often in secret.

Science and diplomacy are two different worlds	
Scientists	**Diplomats**
Unleash new powers	Seek stability and power balance
Creativity and experimentation	Strict protocol, rules, and norms
Risk-tolerant	Risk-averse
Theory	Practice
Facts, evidence and data	Persuasion, influence, and politics

Table 1. Scientists and diplomats have different rules and goals. Source: adapted from Daryl Copeland (2016) "Science Diplomacy for the Age of Globalization". In: *Guerrilla Diplomacy. Rethinking International Relations*. Boulder: Lynne Rienner Publishers.

Science and diplomacy also differ in their time scales for action and level of comfort with uncertainty. Publishing a research paper can take years, while in diplomacy often you have just a few hours to put together a briefing paper. In research, you rely on a lot of information being available and experimentation is central to your job. In diplomacy, you might not have the full picture of a given situation. Information is not always reliable, and experimentation isn't really an option. But there are some important elements that science and diplomacy have in common, like an analytical approach and the importance of trust and relationships.

Pier Francesco MORETTI

CNR Liaison Officer in Brussels and coordinator of School for Science in Decision processes (#school4SID)

Tell us about your science diplomacy training activities.

Video Link to YouTube

In practice, science and diplomacy come together in different ways, as described in the **Royal Society-AAAS 2010 science diplomacy framework**:

- Scientific and technical information is essential to inform diplomatic negotiations and agreements on cross-border issues that no country can solve alone, like climate change, or for the management of global commons and shared resources, like the high seas or transboundary waters.
- During an epidemic outbreak, scientists and public health experts support foreign policy decisions with data, evidence and predictions to inform policy directives on

travel and mobility, border controls, imports and exports, and international scientific and logistical coordination.

- Diplomats pave the way for international science collaboration efforts, such as setting up joint research programmes and large scientific infrastructures like mega-telescopes. Diplomats also provide visas and research permits for scientists to conduct field work internationally.
- Scientific values of transparency, openness and experimentation become a vehicle to improve international relations. Scientists can be 'involuntary' science diplomats when engaging in international cooperation projects that can open channels, spur dialogue and build trust between scientists whose governments are in conflict, perhaps yielding diplomatic benefits in addition to advancing science. For example, a particle accelerator facility was built in the Middle East (see 7.5 SESAME) to promote collaboration between countries with a history of conflict

Read more about this pragmatic approach in the reference below:

- Copeland, Daryl (2009): Guerrilla Diplomacy: Rethinking International Relations. Boulder: Lynne Rienner Publisher (Link)
- Royal Society, The (2010): *New frontiers in science diplomacy*. RS Policy document 01/10. January 2010 - RS1619. London: The Royal Society (Link)
- Ruffini, Pierre-Bruno (2017): Science and Diplomacy: A New Dimension of International Relations, Springer (Link)

6.1.3 Brief Overview of Science Diplomacy Roles

As we have seen, one of the major challenges in defining the roles and characteristics of science diplomats is that there is **not yet an educational or professional pathway**, with few institutionalized positions and many individuals in a range of professional roles self-identifying as science diplomats with no formal position or mandate. Often, individuals working in universities and other non-governmental institutions might not recognise their actions in relation to science diplomacy, but they can be active agents of it.

Gual Soler *et al*. (2017) and Bednarek *et al*. (2018) describe science diplomats as "**boundary-spanning professionals**" acting in the capacity of expert intermediaries between the scientific and diplomatic communities. Lorenzo Melchor (2020) in *The Hague Journal of Diplomacy* describes a typology of science diplomacy practitioners in either institutionalised or non-institutionalised roles (Table 2), which were already presented in *Lesson 2.4. What Kind of Science Diplomats Are There?*.

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: Melchor 2020

Briefly, the **institutionalised positions in science diplomacy** include official roles at embassies, ministries, government agencies, research councils, international organisations and others that either have a formal science diplomacy mandate and/or actively bring science policy and foreign policy together. This category involves science counsellors, attachés, advisers and envoys to embassies, chief science advisers to Ministries of Foreign Affairs, special ambassadors and other liaison officers.

As Orio Ciferri (1987), a microbiologist and former science attaché to the Italian embassy in Ottawa, put it:

"The capacity to collect lots of information is a talent well-suited to a scientist. The need to evaluate it accurately and quickly is a skill essential to a diplomat".

	**Ana ELORZA MORENO** Science Advice Coordinator, Spanish Foundation for Science and Technology, FECYT
	What are competencies and skills necessary for a science diplomat to work at an embassy? Video Link to YouTube
	**Mona Nemer** Chief Science Advisor to Canada's Prime Minister and Minister of Science
	What skills and competencies do you think are needed for your current position? Video Link to YouTube

On the other hand, **non-institutionalised positions in science diplomacy** involve scientists in academia, NGOs or industry, policy entrepreneurs, managers in agencies and research organisations with no government mandate, civil society representatives and other science diplomacy facilitators. They may permanently or occasionally engage in international projects that involve liaising with government officials and international organisations. There is nonetheless a risk of conceptual stretching when considering some of these actors as science diplomats (Melchor 2020).

Read more:

- Bednarek, A.T.; Wyborn, C.; Cvitanovic, C. *et al*. (2018), Boundary spanning at the science–policy interface: the practitioners' perspectives. In: *Sustainability Science*, 13, 1175-1183, (Link)
- Ciferri, Orio (1987): "For Science Attaches, It's Pinstripes, Not Lab Coats" *The Scientist*, 1 June 1987 (Link)
- Gual Soler, Marga *et al* (2017), Connecting Scientists to Policy Around the World. Washington DC: American Association for the Advancement of Science, (Link)
- Linkov, Igor, Benjamin Trump, Elisa Tatham, Sankar Basu, and Mihail C. Roco (2014): "Diplomacy for Science Two Generations Later." *Science & Diplomacy,* 3(1) March 2014 (Link)
- Melchor, Lorenzo (2020): What Is a Science Diplomat. *The Hague Journal of Diplomacy* 15 (3):409-423 (Link)

6.2 Science Diplomacy Skills

In this lesson we will identify key skills to navigate the science-policy interface in general, and in science and diplomacy in particular.

Before delving into these two analyses, listen to what the experts have to say.

William COLGLAZIER

Editor-in-Chief of Science & Diplomacy and Senior Scholar in the Center for Science Diplomacy at the American Association for Advancement of Science (AAAS) Former Science & Technology Advisor to the U.S. Secretary of State.

What skills and competencies do you think are needed for your position?

Video Link to YouTube

Read more!

The information in this Lesson is based on or extracted from the following resources:

- Degelsegger-Márquez, Alexander; Flink, Tim; and Rungius, Charlotte (2018): What it takes to do science diplomacy. Practices, identities, needs and challenges of science diplomacy practitioners. Vienna: S4D4C, (Link)
- Vaughan C. Turekian, Peter D. Gluckman, Teruo Kishi, and Robin W. Grimes (2017): Science Diplomacy: A Pragmatic Perspective from the Inside. In: *Science & Diplomacy*, Vol 6, No 4 (December 2017), (Link)
- Holford, Mandë; and Nichols, Rodney W. (2017): The Challenge of Building Science Diplomacy Capabilities for Early Career Academic Investigators. In: *Science & Diplomacy*, Vol. 6, No. 4 (December 2017) (Link).
- AAAS Introduction to Science Diplomacy Online Course (Link)

Link to institutions

- European Commission Joint Research Centre (JRC) (Link)

6.2.1 Skills for Working at the Science-Policy Interface

The **European Commission Joint Research Centre (JRC)** defined a set of essential skills for researchers and policymakers active in the science-policy interface, many of which apply to the provision of science advice to foreign policy or to a multilateral organisation, and we have adapted them here for science diplomacy:

1. **Understanding Domestic and International Policy, Geopolitics and Global Governance**. Scientists need to understand the key drivers of the policy process - domestic and international - and adapt their evidence presentation strategies to the policy context and geopolitical landscape, taking into account social, economic, trade and other factors affecting diplomatic relationships.
2. **Interpersonal and Cross-Cultural Skills**. Being able to interact well with others – using verbal and non-verbal communication skills - across political, disciplinary, cultural and other divides is essential to building trust and solving problems and addressing conflicts.
3. **Synthesising Research.** Effective knowledge management will provide policymakers with access to more robust and fit-for-purpose evidence. Effective researchers employ methods and tools to make better sense of the wealth of knowledge ('secondary research') available on a given topic.

4. **Managing Collaborative Expert Communities**. 'Communities' of experts, sharing a common language or understanding, are fundamental to creating and applying knowledge to complex problems. Effective researchers develop networking and facilitation skills, through digital and physical interactions, to reduce disciplinary, geographical and policy divides.
5. **Communicating Scientific Knowledge.** The communication of research to a non-scientific audience requires effective communication skills, using content-related tools like infographic design, succinct writing, public speaking and data visualisation tailored to the audience.
6. **Advising Policymakers.** Effective science policy advisers go beyond simply communicating research evidence towards identifying options, helping to understand the impact of policy choices during and after implementation, and understanding that science informs but does not dictate policy.
7. **Engaging with Citizens & Stakeholders:** Engagement with the public (individual citizens) and stakeholders (organisations) can provide a platform for citizens and social actors' views to be combined with scientific expertise in policy contexts increasing the relevance and impact of the evidence provided.
8. **Monitoring & Evaluation Framework.** Monitoring and evaluating the impact of research evidence on policymaking is a specific skill needed to continuously improve the impact of evidence on policymaking.

Figure 1. Skills Map for Evidence-Informed Policymaking, adapted from: Framework for Skills for Evidence-Informed Policy-Making, JRC (2017) (Link)

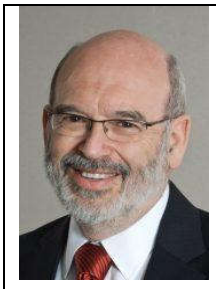
6.2.2 Skills for Science Advice in Foreign Policy

In the article "Science Diplomacy: A Pragmatic Perspective from the Inside", Vaughan Turekian, Peter Gluckman, Teruo Kishi, and Robin Grimes (former science advisors to the

foreign ministries of the United States, New Zealand, Japan, and the UK), identified the following **factors for the success of Chief Science Advisers (CSA)** in Foreign Ministries:

- **Collaboration throughout government**: Strong strategic and operational communication between the chief science adviser within the foreign ministry and other government departments with responsibility for S&T policies.
- **Communication and support within the foreign ministry**: Personal interactions and ability to network at both the political and civil and foreign service levels.
- **Relationships with the scientific community**: The Foreign Ministry CSA should be a recognized and credible figure in the science community, and sufficiently experienced to inspire confidence within the civil service. Ideally, qualifications should include connections with industry.
- **Access to science and technology expertise**: The CSA may need assistance from dedicated teams – e.g., to commission studies or write briefs for officials or ministers.

Science advisers have to recognise the limits of science and accept that they inform rather than make policy themselves (Gluckman 2014). They have to adopt and feel comfortable with the role of a broker (cf. Pielke 2007), not of an advocate, i.e. they have to lay out options instead of prescribing a course of action. They also have to understand competing interests from all societal actors and be able to sustain the trust of the public, the media, policymakers, politicians and scientists, engaging all these communities.

<table>
<tr><td rowspan="2">  </td><td>Peter GLUCKMAN

Chair of the International Network of Government Science Advice (INGSA) and president-elect of the International Science Council (ISC). Former Chief Science Advisor to the New Zealand Prime Minister (2009 to 2018)</td></tr>
<tr><td>What are the competencies and skills necessary for a good science diplomat?

Video Link to YouTube</td></tr>
</table>

6.2.3 S4D4C Survey on Science Diplomacy Skills

Given the fluid definition of the roles and profiles of science diplomats and the aforementioned divides between its participating communities, the S4D4C project carried out a survey to learn from professionals working at the interface of science and foreign policy who self-identify as science diplomats. Through an open online survey conducted in 2018, we obtained an overview of the needs of 130 professionals working at the science-diplomacy interface. We asked respondents to rank the skills-related needs that they considered most important for their job. As depicted in the chart below, **skills such as negotiation, communication, and networking** were ranked highest. Respondents were also interested in improving their knowledge about how science and international relations

are interlinked, as well as about the concept of science diplomacy itself. In the next lesson we are going to explore those skills in detail.

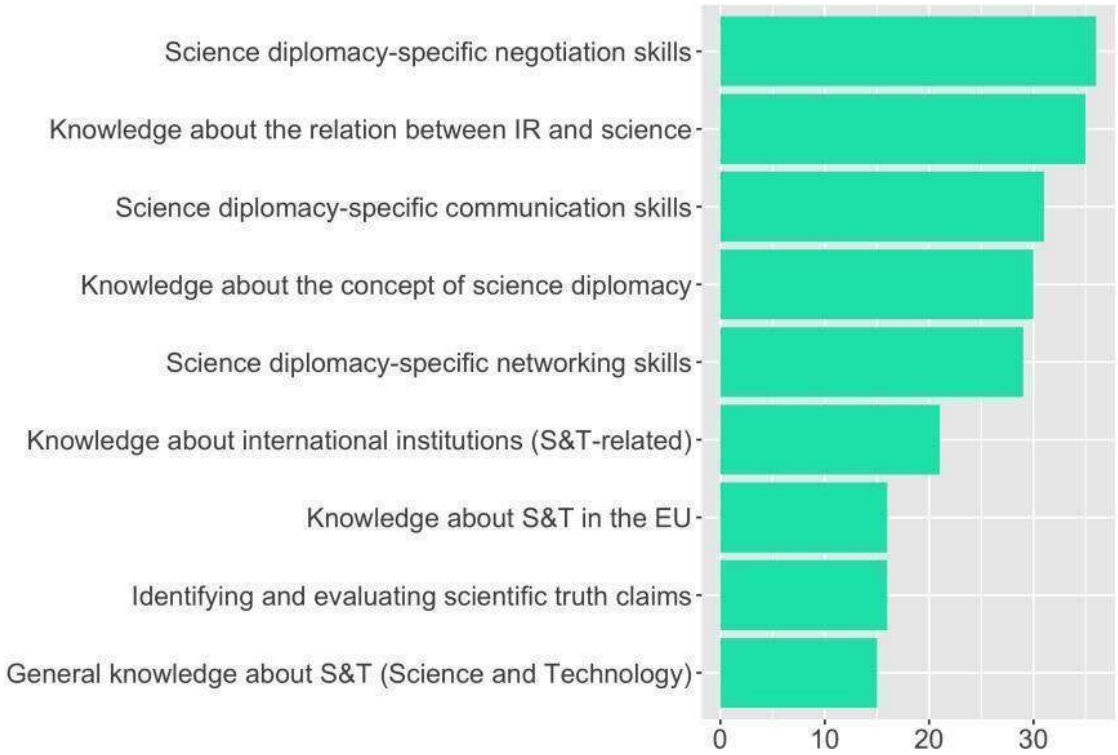


Figure 2. Ranking of skills for science diplomats. Source: Degelsegger-Márquez, Alexander; Tim Flink, and Charlotte Rungius (2018): *What it takes to do science diplomacy. Practices, identities, needs and challenges of science diplomacy practitioners. Baseline analysis and needs assessment*, Deliverable 2.3, Vienna: S4D4C (Link)

6.3 The Science Diplomat's Toolbox

The set of knowledge and skills required to perform as science diplomats is broad and depends on the starting background (STEM or international affairs) of the individual. To begin with, a basic understanding of international science, technology and innovation landscape is required if you come from a diplomatic background, likewise knowledge of foreign policy and international relations if you come from a STEM background is essential:

Scientists should learn the fundamentals of history, politics, public policy, economics and international relations theory, as well as develop a basic understanding of multilateral organisations and principles of international law governing international spaces, global commons and transnational issues where science plays a key role (in particular for environmental sciences).

For **diplomats**, developing an understanding of the scientific method and the culture and processes of scientific research (publication, peer-review, funding mechanisms, etc.) is key to help establish international research collaborations from embassies and foreign ministries, as well as understanding international scientific institutions, emerging technologies and the scientific basis for negotiations and agreements.

In addition, scientists and diplomats would benefit from **joint education in cross-cutting issues**, such as a deeper understanding of global scientific governance and the interaction between science, technology and innovation and its repercussions onto the economy and geopolitics.

So-called **'boundary skills'** for effective communication and connection between the two worlds include negotiation, project management, intercultural sensitivity, networking, storytelling, languages, and science literacy.

	Scientists	Diplomats
Content-based knowledge	• An overview of the humanities (history, law, political science) and international relations • Culture, values and timescales of diplomacy • Public policy, foreign policy • A basic understanding of international organizations and international law • International spaces, global commons and transnational issues • International negotiation theory • Distinguishing between scientific advice, advocacy and activism	• An overview of the natural and social sciences, including laboratory practice • Culture, values and timescales of science • Epistemology, the scientific method (basics of observation, experiments and reproducibility) and the research process (peer-reviewed publications, scientific consensus) • Major contemporary issues and trends in science and technology • Research management and funding • Global collaborative science networks (formal and informal)
	• Science as a transnational epistemic community, mobility and collaboration issues • Global scientific governance, international scientific institutions, international science-based agreements • Large international research infrastructures (issues of governance, diplomacy, open access and open science) • Science, technology and innovation and their repercussion onto the economy and society: from blue-sky science to innovation (and vice-versa) • Issues of science capacity building, technology transfer, science as a public good versus private good • Case studies of science as a tool for diplomacy and diplomacy advancing science	
Skills-based knowledge	• Basic negotiation skills (e.g., acquired through simulation games) • Public speaking, communication and outreach • Interpersonal skills, networking, building partnerships and coalitions • Cross-cultural and cross-discipline awareness • International project management • Balancing scientific facts with competing interests and values of diverse sets of stakeholders (political, economic, cultural, religious) • Memo-style writing, policy briefs	• Quantitative and qualitative research methods, basic data analysis skills • Critical thinking skills • Dealing with data biases, incompleteness • Managing scientific uncertainty • Distinguishing between correlation versus causation, inductive and deductive reasoning • Contrasting between legitimate science vs. pseudoscience and accessing reliable sources (journals, citations, repositories) • Identifying and accessing scientific experts in different fields • Risk analysis

Table 3. An educational curriculum for science diplomats.
Source: JC Mauduit and Gual Soler (2020).

The science diplomat's toolbox		Already in your toolbox?	
		Scientist	Diplomat
Knowledge	Scientific research experience (natural sciences, physical sciences, social sciences and humanities etc.)	Yes	Not likely
	International relations and/or public policy	Not likely	Yes
	Understanding of the science, technology and innovation (STI) policy national and international landscape	Yes	To develop
	Understanding of the international policy landscape	To develop	Yes
Skills	Communication, narrative and writing skills for all audiences	To develop	Yes
	Intercultural sensitivity	To develop	Yes
	Brand ambassador and public relationships	To develop	Yes
	Languages	Likely	Yes
	Project management	Yes	Yes
	Liaise with scientific uncertainty	Yes	To develop
	Scientific literacy	Yes	To develop
	Scientific credibility and ability to harness scientific knowledge and networks	Yes	To develop

Table 4. The Science Diplomat's Toolbox. Source: Melchor 2020.

In the following section let's explore some of those skills in detail.

6.3.1 Negotiation skills

In international diplomacy, negotiation consists of discussion between officially designated representatives. Their aim is to achieve a formal agreement between their governments to agree a way forward on an issue that has come up in their relations or to establish a multilateral agreement or treaty on a particular topic. Negotiators are often faced with the paradox of trying to maximize their individual interest whilst at the same time knowing a deal can only be found collectively. But negotiations are more than a clash of different objectives and ideas. They are also opportunities to explore common ground and establish trust between participants, and are being increasingly influenced by a range of non-state actors, including non-governmental organisations (NGOs), industry, and networks of scientists and universities. Negotiation is **one of the key skills for science diplomacy** at both the bilateral and multilateral levels.

Negotiation skills are qualities that allow two or more parties to reach a compromise. These are often so-called 'soft skills' and include leadership abilities such as

communication, persuasion, working in teams, strategic planning, and cooperation. The most effective negotiations aren't always about winning, but rather about getting good results for ourselves and our negotiating partners while maintaining positive working relationships which can be crucial in future interactions (a strategy known as the *mutual gains approach*).

Read more about negotiating:

- Top Ten Effective Negotiation Skills (Link)
- CBI's Mutual Gains Approach to Negotiation (Link)
- Water Diplomacy: Creating Value and Building Trust in Transboundary Water Negotiations (Link)

6.3.2 Role-play simulations

The **best way to learn and practice negotiation skills** is to engage in simulated experiences like role-playing mock negotiations. To bridge theory and practice, many educational approaches use experiential learning to place participants in various simulated scenarios to identify and develop the skills to negotiate an international agreement or overcome a diplomatic conflict, for example in water and environmental cooperation.

Past cooperative encounters between scientists and diplomats can be used as case studies. Drawing from such experiences, students are assigned country/organisation positions, given a particular case, and asked to articulate and negotiate their position in a manner representative of their real-world counterpart. The role-play simulation allows the player **to identify the boundaries and optimal conditions** for applying their scientific expertise in a particular diplomatic scenario. As scientists and engineers being asked to provide expert information, they experience first-hand the nuances between advising, advocacy, and activism. Role-playing reveals the ambiguities, trade-offs, and competing interests at play in the policy process.

The **AAAS Center for Science Diplomacy** has compiled a list of resources for teaching negotiation skills in the context of science diplomacy. One such resource is the **Mercury Game**, developed at Massachusetts Institute of Technology (MIT). The Mercury Game is designed to teach people about the role of science in international environmental policymaking. Participants become immersed in negotiating an international environmental treaty to regulate mercury pollution and face the challenges of communicating and managing scientific uncertainty to different audiences. Using the findings in the United Nations Environment Programme's (UNEP) Global Mercury Assessment, the game brings diplomats from North and South nations, science advisors, non-governmental organisations (NGOs), and industry lobbyists around the negotiation table to devise a global agreement for regulating the limits of mercury in food, artisanal products, and industrial output.

When scientists take on roles in the Mercury Game, they shed their own identity and adopt a different character and perspective in order to push forward their agenda and interests. The most effective players learn to frame scientific uncertainty positively or negatively to their advantage - depending on their roles as science advisors, NGOs, industry lobbyists, or country officials. For example, a common tactic by industry representatives is to delay

action or regulation based on the lack of definitive scientific evidence, hence the importance of learning to manage and communicate uncertainty.

	**Mercury Game trailer**
	Video Link to YouTube

Through role-play negotiations, scientists are challenged to experience different value systems and defend arguments with which they might not agree outside the terms of the game, thus experiencing the realities of being a diplomat and having to **defend your country's position** even if it's contrary to your personal values and beliefs. They learn to assess the **credibility of various sources of technical information**, **balance scientific and political considerations, grapple with geopolitics** – exploring the dynamic between the global "North" (the developed world) and the global "South" (the developing world) at the heart of most multilateral agreements- and most importantly, they learn to follow protocol. In diplomatic settings, you cannot speak whenever you like: order, rank, hierarchy and tone of delivery are critical. A scientist called for expert advice that ignores protocol will be ineffective, no matter how robust the data she brings.

Experiential learning teaches skills like mental agility, professionalism, cultural sensitivity, and empathy that are essential to reach effective, science-informed responses to today's global challenges.

It is important, however, to point out the **limits of science diplomacy.** The negotiation of international treaties and agreements usually takes place under considerable scientific uncertainty. In general, problems are rarely fully understood at the time political decisions must be made - especially during emergencies, as we have seen with the COVID-19 pandemic - and international negotiations often begin before conclusive scientific evidence is at hand. In addition, Pierre-Bruno Ruffini (2018) argues that the extent to which diplomats understand and use scientific knowledge as well as that the clashing of national interests during major negotiations can jeopardize science diplomacy effectiveness. In the case of climate change, the large consensus that exists among scientists about the origins and long term risks of climate change does not always translate into a consensus among diplomats over the appropriate course of action.

Read more!

The information in this module is based on or extracted from the following resources:

- G. R. Berridge, Theory and Practice of Negotiations, DiploFoundation (Link)
- The diplomatic keys to successful negotiation (IE University) (Link)
- Pierre-Bruno Ruffini (2018), The Intergovernmental Panel on Climate Change and the Science-Diplomacy Nexus (Link)

6.3.3 Languages and intercultural communication

Major components of diplomacy include **careful listening, attentiveness to nuance, and responsiveness to tone**. One of the best ways to develop cultural sensitivity is to learn another language, which allows the negotiator to build trust and better understand and anticipate the goals and motivations of counterparts. **Speaking the local language** is an advantage because it allows direct communication with the counterparts rather than relying on translation or interpretation, which can lead to misunderstandings. Many scientists already bring language skills to science diplomacy as they learn a second or third language as part of their international career development.

As Marga Gual Soler describes in her 2015 essay in *Slate:*

> *"My training in biomedical sciences, the cross-cultural awareness provided by my international experiences, and my bilingual proficiency in English and Spanish happened to be the right combination for this project. Unknowingly, I had acquired the right set of skills and experiences of a "science diplomat." [...] When I left academia, I could have never imagined that someday I would be able to use my scientific skills to help improve relationships between the United States and Cuba, two countries that have been enemies for nearly six decades."*
>
> - Marga Gual Soler (2015) "How I became a science diplomat", *Slate.* *https://slate.com/technology/2015/10/how-i-became-a-science-diplomat.html*

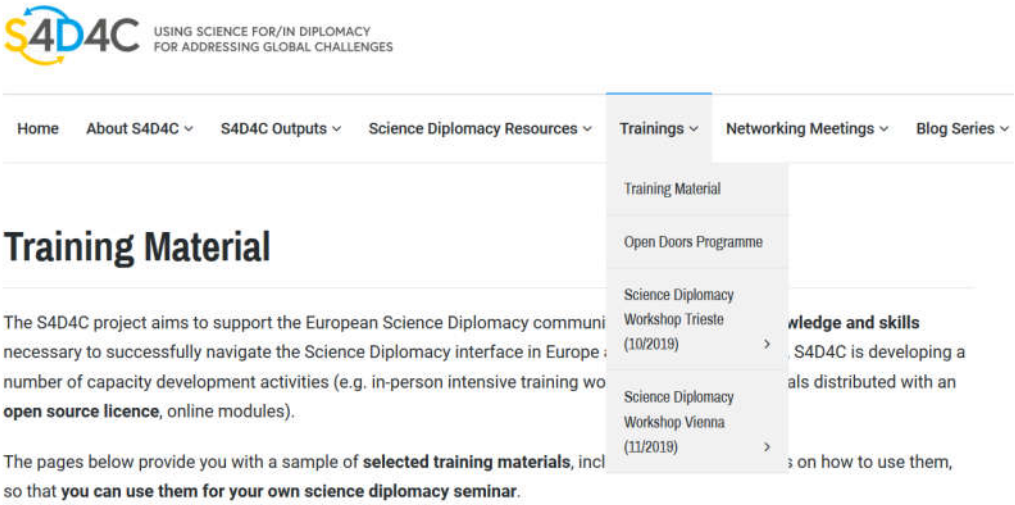
Intercultural competence describes a range of cognitive, affective, and behavioural skills that lead to effective and appropriate verbal and non-verbal communication with people of other cultures. Appropriate **intercultural communication** includes behaviours that suit the expectations of a specific culture, the characteristics of the situation, and the level of the relationship between the parties involved in the situation. It also takes into consideration one's own cultural background and the best appropriate, comfortable compromise between the different cultural norms.

6.4 Science Diplomacy Curriculum and Training materials

Science diplomacy lacks a formal educational path and while training opportunities are still limited, they are becoming more frequent. Workshops typically combine different session formats (such topical lectures, simulation exercises, site visits and group work) and provide participants with time and opportunity to network and exchange experiences.

The S4D4C team has elaborated a **Toolkit for Trainers** to guide institutions and individuals planning science diplomacy training activities https://www.s4d4c.eu/toolkit-for-trainers/:

Furthermore, **a sample of selected materials** with recommendations and advice from S4D4C authors and facilitators has been collected: [Training Materials https://www.s4d4c.eu/training-material/](https://www.s4d4c.eu/training-material/).



These training materials are categorised along four learning objectives:

1. **Knowledge transfer**: resources to provide basic information and theoretical background (e.g. history and definitions of science diplomacy) for trainees.

2. **Knowledge exchange**: instruments to provide participants/trainees with opportunities to present opinions and allow for more in-depth knowledge-sharing (e.g. science diplomacy roundtables and debates).
3. **Knowledge application**: after conveying the basic knowledge and main examples, it is important to apply learning in the most interactive and contextually-relevant way, with experiential activities like simulation games and role-play exercises.
4. **Knowledge consolidation**: Repetition is crucial! It's useful to combine the review and evaluation process with a reward component - including a little fun. Interactive quizzes and reflection circles ensure a well-rounded and lasting training experience for the participants.

Furthermore, the JRC is pleased to share some further training materials on how to effectively provide scientific evidence to policymaking:

- Curriculum (in English) for 2-day interactive course on Science for Policy
  The JRC offers a 2-day professional training course material on assessing science, understanding policymaking processes and gaining insight into the interaction between the different paradigms in which scientists, policymakers and politicians operate. It will help scientists to become reflexive practitioners, mastering the complex task of providing the appropriate knowledge and services with confidence, skill and respect for their scientific and institutional value
- 1-hour e-learning module "Science for Policy – how to increase your policy impact"
  This course is essential for researchers who would like their research results to have greater policy impact, but may not have the know-how to communicate effectively with policy makers. The Science for Policy e-learning course provides the skills that early to mid-career researchers need to increase the impact of their research results on policy and society at large.
- 10 tips for researchers on how to increase their impact on policy
  These are JRC's top tips for researchers and research organisations aiming to achieve policy impact, based on JRC´s practice at the science-policy interface.
- 'Science4Policy' Competence Framework for researchers
  The JRC has seen a need and an added value in consolidating the evidence on what it takes for scientists, in terms of competences, to increase the uptake and impact of their research on policy. The 'Science4Policy' competence framework consists of 5 clusters of competences and a total of 27 competences. This is a collective set of competences, that a department or organisation working at the science-policy interface may cover. For each of the 27 competences, the JRC has defined 4 levels of proficiency: foundational, intermediate, advanced and expert.

Additional resources are available on the AAAS Science Diplomacy Education website for planning in-person training: https://www.aaas.org/program/center-science-diplomacy/training.

But ad-hoc training experiences are not enough. The next step for consolidating science diplomacy education will be mainstreaming into university curricula. Mauduit and Gual Soler (2020) have proposed a sample syllabus for a university course on the theory and practice of science diplomacy.

Theory and practice of science diplomacy	
Science policy and diplomacy fundamentals	• Science and public policy fundamentals ◦ Overview of the sciences (natural and social) and the scientific method ◦ Basic and applied science, innovation and the economy ◦ Case studies in science policy (e.g., science funding, health, environmental, energy policies in various countries) • Science advice vs advocacy: why, who, how? ◦ The nexus of science, society, politics, economics, values and religion ◦ Influence of politics and society on science (and vice-versa) ◦ Scientific advice to government • Science diplomacy fundamentals ◦ The nexus of science, international relations and global governance ◦ History and evolution of science diplomacy ◦ Current frameworks of science and technology in international relations, evolving theories and definitions of science diplomacy ◦ An overview of the ecosystem of actors in science diplomacy ▪ Ministries of foreign affairs, embassies and consulates ▪ Multilateral organizations, international scientific organizations ▪ Academies of sciences, scientific formal and informal networks ▪ Non-profit organizations and foundations in science ▪ Businesses and transnational technology companies
International engagement in science and technology	• Major contemporary issues and trends in science, technology and innovation • Issue areas of science diplomacy, overview of scientific drivers in diplomacy (e.g., global health, nuclear, environment, oceans, cyber, biomedical, trade, security) • Nation-states, diplomacy and global governance • International scientific institutions, networks and governance • International spaces and international treaties (environmental, science-driven), global commons, transnational/transboundary issues and shared resources • Treaty-based international scientific organizations, Big Science and international large research infrastructures (membership, open science and access issues) • International scientific collaborations: diplomatic successes and challenges • Science in the United Nations system, the role of science, technology and innovation for the Sustainable Development Goals • International scientific development and capacity issues, technology transfer, scientific mobility and circulation
Science diplomacy in practice	• National approaches to science diplomacy, strategies and implementation • Interfaces and mechanisms enabling international policy and diplomacy exposure (science advisors in foreign ministries, science attachés, fellowships) • International approaches to science diplomacy, transnational and global challenges • Science-intensive international negotiations • Science and technology cooperation under political strain • "Political" versus "Economic" framework (with role-play simulations and case studies) ◦ "Political" science diplomacy ▪ Science in foreign policy, public diplomacy and soft power ▪ High-level science and technology networks and fora ▪ Influencing and agenda setting in international scientific organizations ▪ Large international research infrastructures ◦ "Science, Technology and Innovation" diplomacy: economic repercussions ▪ Ministries (foreign affairs/economy/science) and economic interests ▪ Technological watch, horizon scanning and technology disruption ▪ Innovation consulates and startup incubators ▪ Technology giants as transnational and geopolitical actors • Developing science diplomacy skills and competencies (see **Table 1**) through experiential learning (e.g., via role-play simulations)

Table 5. Theory and practice of science diplomacy. Source: JC Mauduit and Gual Soler (2020)

Find more training activities here:

Courses

- The Hurford Science Diplomacy Initiative, The Rockefeller University (Link)
- Executive Summer Program on Innovations in Science Diplomacy, United Nations Institute for Training and Research (UNITAR) in collaboration with Harvard Law School (Link)
- Science Diplomacy Week, Geneva Science and Diplomacy Anticipator (GESDA) (Link)

Videos/Webinars

- Science Diplomacy for Global cooperation, EURAXESS ASEAN R&I Days 2021 (Link)
- What is Science Diplomacy? European Research Days Aus NZ 2020 (Link)
- Science Diplomacy in the Global South: Challenges and opportunities, SciDipTalks (Link)
- Developing the Next Generation of Science, Dartmouth (Link)

6.5 Summary

In this module we have highlighted the most important skills for science diplomats to be effective. These include 'boundary skills' for effective communication and connection between the two worlds **(Table 6)**, and skills that are typically developed as part of a career in science or in diplomacy that professionals coming from the other side should learn about **(Table 7)**.

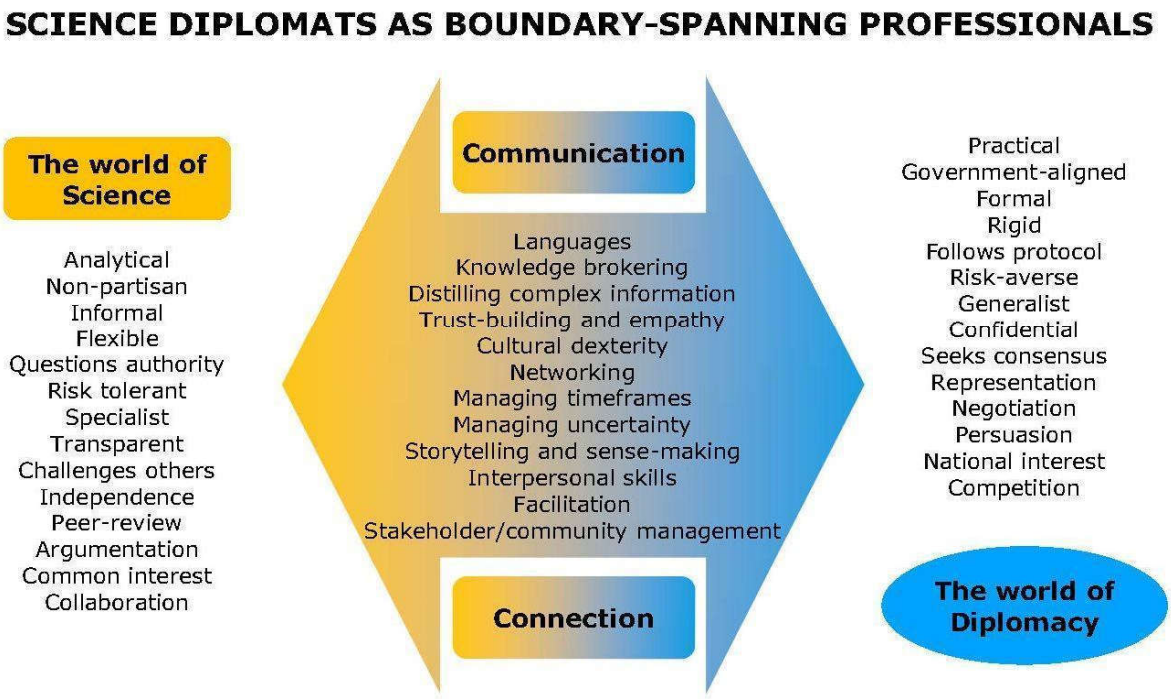


Table 6. Recommended boundary-spanning skills for effective science diplomacy

SCIENTISTS	DIPLOMATS
❖ Basic negotiation skills (e.g. acquired through simulation games) ❖ Public speaking, communication and outreach ❖ International project management ❖ Building partnerships and coalitions ❖ Understanding the difference between scientific advice, advocacy and activism ❖ Interpersonal skills, networking	❖ Quantitative skills (e.g. back of the envelope calculations, orders of magnitude) ❖ Distinguish between correlation vs. causation, inference vs. deduction, biases ❖ Basic data analysis skills ❖ Contrasting between legitimate sciences vs. pseudosciences and accessing reliable sources (journals, citations, h-index, etc.)

❖ Cross-cultural & cross-discipline awareness ❖ Balancing scientific facts with competing interests and values of diverse societal stakeholders (political, economic, cultural, religious, etc.)	❖ Managing scientific uncertainty ❖ Identifying and accessing scientific experts in different fields

Table 7. Recommended skills for scientists and diplomats to learn from each other for effective engagement in science diplomacy.

6.6 Question Time

6.6.1 Brainstorming questions

Please reflect about the main messages you have learned in this module.

- What skills are essential for science diplomats? Consider those identified by our experts and what the literature and our survey have shown. What skills do you already have? What could you improve?
- What are the main differences between the worlds of science and diplomacy? Are there any common skills between both communities?
- Which negotiation skills can we learn from negotiation simulations? Why are those role-play exercises important?

Let's see how much you've learned – Quiz Time: What set of skills do you need to be a good science diplomat?

Take this quiz to evaluate how much you've learned. You need to get 8 questions right out of 10 in order to move to the next module. You can take the quiz as many times as needed.

Question 1: Which of the following skills are essential for effective science diplomats?

A. Negotiation, communication and networking
B. Connections to a political party
C. A scientific background
D. Languages, communication and conflict-provoking skills

Question 2: The best negotiation strategy is to avoid compromise at all costs. Remember, the famous saying is "the winner takes it all" (T or F)

Question 3: In diplomatic negotiations, the science is always clear (T or F)

Question 4: When providing scientific advice for policy, the evidence always dictates the course of action (T or F)

Question 5: The most effective science advisers:

A. Advocate for a particular policy option based on the best available science
B. Are informed by the best available science, provide a range of policy options for the decision-makers to consider
C. Attend demonstrations in front of government buildings and shout their recommendations from a megaphone
D. Actively engage with media and party opposition leaders to influence governmental actions

Question 6: What is intercultural communication?

A. The ability to speak the same language as someone else
B. Verbal and nonverbal interaction between people from different cultures
C. A mobile phone company
D. The system of interaction between people within a single culture

Question 7: Science diplomats need only soft skills to be successful (T or F)

Question 8: In a multilateral negotiation, scientific uncertainty can be used to delay action (T or F)

Question 9: To function as a science diplomat you need an official title issued by the government (T or F)

Question 10: In a role-play negotiation simulation, you always adopt the character or position that aligns with your own opinion or values (T or F)

Quiz Solution

1A

2F

3F

4F

5B

6B

7F

8T

9F

10F