

DIPLO



Science Diplomacy Capacity Development

Reflection on Diplo's 2021 course and the road ahead

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Introduction

Delivering Diplo's 2021 Science Diplomacy online course

Katharina E Höne

Diplo has a track record of more than 20 years of capacity development in diplomacy. Given the increasing relevance of science diplomacy, expanding our program to include aspects of its theory and practice felt like an organic development. We offered our ten-week Science Diplomacy course for the first time in October 2021.

Our Science Diplomacy course builds on a number of conversations in our Diplo WebDebate format (DiploFoundation, 2022a, 2022b) and research conducted in conversation with practitioners at CERN (The European Organization for Nuclear Research), which led to reflections on suitable institutional frameworks and effective capacity development for Science Diplomacy (Höne and Kurbalija, 2018). At its core, our 2021 course is a collaborative effort.

We partnered with two Geneva-based organizations, the Geneva Science and Diplomacy Anticipator (GESDA) and the Geneva Science-Policy Interface (GSPI). GESDA and GSPI provided course materials and co-lectured on the course. Both Diplo and course participants benefited tremendously from this cooperation. Furthermore, this and other initiatives, such as the Science Diplomacy Week (Jefford, 2022), highlight the importance of collaboration on Science Diplomacy within the Geneva ecosystem.

The lecture team was completed by Dr Tim Flink who brought his rich experience as a Science Diplomacy researcher and offered the important ability to separate hype from reality when it comes to the practice of Science Diplomacy. Reaching across the Atlantic, Diplo US partnered with the National Science Policy Network as part of their Science Diplomacy Exchange and Learning (SciDEAL) program. This meant that we worked with five NSPN SciDEAL fellows over the course of 2021 to develop course materials and to have conversations on the nature and utility of Science Diplomacy. The fellows brought their knowledge and skills in the 'hard' sciences and science policy to the table and developed them further in conversation with us and with our course participants.

Speaking of collaboration, our course participants also need to be mentioned. Diplo's learning methodology is collaborative at its core and places joint knowledge construction as its highest value. This course brought together a cohort of 21 participants that came from both science and diplomacy, covering a wide range of scientific specialisations. Bringing diplomats and scientists together in the same course was an important element contributing to joint knowledge construction. Moreover, the diversity of backgrounds meant that participants were experts in some areas while completely new to other areas of Science Diplomacy, which led to further mutual learning experiences. The 100% course completion rate is a testament to their dedication.

In the following, you will find reflections from the course lecturers, the NSPN SciDEAL fellows, and, most importantly, course participants. For us, it was crucial to bring everyone together while the

course was still fresh in their minds and ask for reflections on capacity development in Science Diplomacy and future directions of Science Diplomacy.

Course participants in particular reflected on how to integrate the lessons from the course into their work. For some, the course even provided the impetus to re-adjust the future trajectory of their career. In particular, the concept of 'boundary spanning', which describes bridging the policy and scientific spheres to facilitate research and increase policy impact (Gustafsson and Lidskog, 2018), proved to be useful for many participants in orienting their future plans.

For Diplo, delivering this course provided a lot of inspiration and motivation to keep engaging in capacity development in Science Diplomacy. The prominence of the topic has been steadily increasing over the last ten years and we find that the various tools and knowledge offered under the umbrella of Science Diplomacy are crucial in addressing some of the most pressing problems of our planet and our time. Nevertheless, we are also mindful of the trap of hype around Science Diplomacy (Kurbalija, 2022), which bears the danger of emptying it of meaning. It is precisely this balancing act that we want to get right with our future science diplomacy capacity development.

Contributors

Course lecturers



Nikola Božić is a science educator and science communicator. For the last 15 years, he has been involved in various educational programmes for gifted high school students. He was the director and programme director of the Petnica Science Center, an independent organisation for extracurricular science education in Southeast Europe.



Dr Marga Gual Soler is a Science Diplomacy expert and founder of SciDipGLOBAL, a purpose-driven advisory, consulting, research, and training firm dedicated to building bridges between science, technology, and global policy. She is a senior advisor to the Geneva Science Diplomacy Anticipator (GESDA), founding member of the EU Science Diplomacy Alliance, and visiting professor at the National Autonomous University of Mexico (UNAM).



Dr Katharina Höne is Diplo's Director of Research. She researches, writes, and teaches on a number of issues in the area of diplomacy, global governance, and the impact of technology on international relations. Over the last few years, she has focused on research at the intersection of diplomacy and technology.



Pavlina Ittelson joined Diplo in 2017 and currently serves as the executive director of Diplo US. She focuses on the legal aspects of internet governance in the fields of internet jurisdiction, cybersecurity, and alternative dispute resolution.



Nicolas Seidler is the executive director of the Geneva Science-Policy Interface (GSPI). He leads the GSPI's mission to enhance scientific engagement with global governance actors within the Geneva ecosystem, with the objective to facilitate the emergence of effective, evidence-informed policies and solutions to complex global problems.



Maxime Stauffer is co-founder and chief executive officer of the Simon Institute for Longterm Governance. His work focuses on the governance of low-probability, high-impact risks from emerging technologies and on the representation of future generations in policy processes. Previously, he was a senior science-policy officer at the Geneva Science-Policy Interface and a research fellow at the Global Studies Institute.

NSPN fellows



Dr Sona Chowdhury is a Senior scientist (specialist) in the Department of Medicine at University of California, San Francisco. She is a virologist by training and her research focuses on immunotherapy for cervical and anal cancer. She is an educator, public speaker, science advocate and actively engages in science policy.



Tara Illgner recently received her master's in atmospheric science and energy policy from the University of Virginia. Her work focuses on reduced-carbon energies, carbon capture, science-communication, and policy. Currently, she is a Yale Environmental Fellow placed with the MacArthur Foundation's Climate Solutions team working on an equitable clean energy transition for the U.S. and India.



Dr Ryan Haupt is the Director of WV STEM Programming for the National Youth Science Foundation (USA), where he develops after-school and extracurricular opportunities. He obtained his undergraduate degrees from the University of California, Santa Cruz, his master's from Vanderbilt University, and his doctorate from the University of Wyoming, where he studied the diets of living and extinct sloths.



Levi Helm is a PhD Candidate at Arizona State University. His research investigates the unintended consequences of well-intentioned environmental interventions. With a background in both the natural and social sciences, he is passionate about developing just, sustainable, and equitable evidence-based policies to address global sustainability challenges.



Nikita Lad is a doctoral student at George Mason University, researching ways to assess student sustainability learning and decision-making. Her interests lie in environmental social science, evidence-based policymaking, and science policy. She also holds a master's and bachelor's degree in natural sciences from India, and has professional experience in regulatory affairs. She enjoys exploring new places, cooking, and watching movies.

Course participants



Souhila Amazouz is a Senior ICT Policy Officer; she works for the Information Society Division within the African Union Commission (AUC), where she contributes to the elaboration and formulation of continental policies, strategies and regulations on issues related to ICTs, Radio Communications and Emerging Digital Issues.



Katharina Beyer is a medical doctor (GP & emergency medicine) and Global Health student with a passion for planet earth, space and other cultures. At the frontline during the COVID-19 pandemic and witnessing climate change during her almost 20 years of work in ski resorts, she became interested in Science Diplomacy and the interaction of different disciplines through the systems thinking lens.



Vojko Bratina is S&T Attaché at the Science and Technology Section of the Delegation of the European Union to China. He joined the European Commission in 2008, working on the implementation of research policy in the domain of Earth Observation and Climate Change. As of January 2015, he has been working with EC Executive Agencies INEA and REA as Project Officer.



YingChu Chen is on the International Affairs Committee in the Taiwan Network Information Center, and an assistant research fellow in Taiwan Institute of Economic Research. She researches the digital economy, compliance, and gender equality issues. She engages with national and regional internet governance forums, and finished Diplo's Advanced Diploma in Internet Governance in 2019.



Encieh Erfani is an Assistant Professor of Physics in Iran. She obtained her PhD from Germany in 2012. She is a Junior Associate of the ICTP, Italy, a TWAS Young Affiliate member, and an executive committee member of the Global Young Academy.



Aura Fossati is the Scientific Director of the Italian Archaeological Mission in Mexico and she currently works within the Centro Studi Americanistici Circolo Amerindiano. She is an archaeologist and a specialist of cultural heritage protection in fragile contexts and she focuses on issues related to the illicit trafficking of cultural property, heritage geopolitics, management and community development.



Dr Patrick Furrer acted as EU National Contact Point for the European Programme in ICT in Switzerland for nearly 13 years. He then assumed the role of vice-rector for research and innovation at the largest University of Applied Sciences in Switzerland (HES-SO), before becoming national coordinator for the scientific information program (2017-2020). He is now a freelance consultant at www.furizon.online.



Carlos Arturo García Bonilla is a Colombian diplomat. From 2015 to 2021 he served as Consul in Ecuador, Venezuela and Nicaragua and recently came back to Colombia as coordinator for academic cooperation in the Diplomatic Academy Augusto Ramirez Ocampo, the academy in charge of the training and formation of current and future Colombian diplomats.



Petal Punalall Jetoo is the Associate Corporate Quality Manager at Laboratories with American Sugar Refining Inc. and leads the Global Laboratory Community of Practice. She has coordinated UNESCO science, sustainability and education projects in several Caribbean countries and volunteers with the Caribbean Academy of Sciences (CAS).



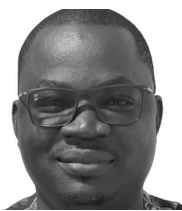
Mouloud Khelif is a governance and sustainability strategy consultant. He is Ingénieur de l'Ecole Nationale de l'Aviation Civile, holds an MSc (Polytechnic Toulouse) and an MBA (HEC Montreal). He completed Diplo's Advanced Diploma in Internet Governance and the Executive Master in International Negotiation and Policymaking from the Geneva Graduate Institute. He is an ICANN Fellow (73&75).



Patricia Kiconco is a medical laboratory scientist from Mbarara University of Science and Technology, Uganda. As an early career scientist, she is interested in public health, infectious diseases and antimicrobial resistance, and since studying Science Diplomacy, global health policy and research.



Massimiliano Lombardo is Programme Specialist for Natural Sciences at the UNESCO Cluster Office for the Caribbean. He has extensive international professional experience as an environment and sustainable development specialist, a programme and project manager, international development policy advisor and science diplomat.



Désiré Néboua is a physician specialized in international public health. He is currently based in Dakar, Senegal where he works for ALIMA, a medical NGO, as a medical coordinator. He is also the executive director of GRADES (Groupe de Recherche et d'Action en Diplomatie Et Santé), a think tank that works on the interface between diplomacy and health.



Dr Vid Nukula currently works at EMBO. Previously, he worked at the Office of Global Affairs, U.S. Department of Health & Human Services at the U.S. Embassy; Wellcome Trust/DBT India Alliance; Institute for Alternative Futures; and Indo-U.S. Science & Technology Forum. He is interested in biomedical science, technology & innovation, global health, ethics, policy, diplomacy, and community engagement.



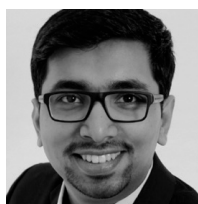
Estefania Ortiz Calva is Senior Program Associate at the AAAS Center for Science Diplomacy (CSD). She supports the development and expansion of international relationships and programs, particularly in Latin America and the Caribbean. She develops Science Diplomacy training, manages the AAAS David and Betty Hamburg Award for Science Diplomacy, and oversees the editorial process for the journal Science & Diplomacy.



Dr Lakmini Premadasa is an infectious disease scientist from Texas Biomedical Research Institute, San Antonio, Texas, USA. Her research focuses on Human Immunodeficiency Virus (HIV) pathogenesis studies and finding novel treatment modalities for HIV induced co-morbidities in people living with HIV. She is a native of Sri Lanka.



Sovanndanit Roath is a junior diplomat working at the Ministry of Foreign Affairs and International Cooperation of Cambodia. She has completed Diplo's Science Diplomacy online course as a participant in the first cohort. Sovanndanit has a background in economics and development and has been working in the field of international relations since 2020.



Dr George Thomas is working with Frontiers as a Public Affairs Coordinator in Switzerland. He has his roots from India with a background in biotechnology before moving to Germany for his PhD. Accumulating entrepreneurial experience from science start-ups, he is currently involved in the interface between open science, science engagement and policy.



Samir Yeddes is an advisor at the Swiss Mission to the UN in Geneva currently responsible for the implementation of Switzerland's foreign policy concerning science, platforms, and think tanks in Geneva. He holds a MA in international relations from the Graduate Institute of International and Development Studies in Geneva and studied international law at the University Panthéon-Assas in Paris.



Muna Zaqsaw is the manager of the science and innovation fund of the British Embassy in Jordan, the Newton-Khalidi Fund. She has a scientific background with her master degree in solid state physics and 11 years in 'boundary spanning' and advancing science and research in Jordan.

Reflections

from

course lecturers

Interdisciplinarity and collaboration to address global problems

Nikola Božić

Diplo's Science Diplomacy course was an extraordinary experience for me because it was created from scratch and addressed an emerging field. We are living in an era in which the importance of cooperation between scientists and diplomats, and the need for mutual understanding, is rising. For many decades there were just a few areas connecting these two fields of human activity, but these areas are becoming more numerous.

Science gives us explanations of natural phenomena, describing interrelationships, and aiding understanding of processes in nature. We are currently living in a world where science is not just a human activity which gives us knowledge and a basis for education. Today the development of science and technology influences every person and every country in the world.

With a scientific background, I have always tried to promote and explain science. I believe that scientific facts should be explained to the public, and that everyone has the right to be informed about scientific knowledge. In the last ten years, science has intertwined with the development of human society to the extent that the interests of countries as well as global companies are now involved.

Science is no longer reserved for scientists, because it has much broader implications. That is why I have a personal connection with this topic. I think that platforms need to be established for discussion, collaboration, and mutual understanding of scientists, diplomats, politicians, companies, international organizations, and the civil sector.

Science Diplomacy is a very interdisciplinary field of human activity. Different scientific disciplines help to understand the complex world, but as such they also have an impact on different parts of society and human work. Science has always been global, but it is no longer global only in a closed scientific community. It affects different countries, regardless of whether they themselves are part of certain research processes.

Space as a public good, for example, has recently become interesting for countries that have not had their own space exploration, as well as for private companies. Space exploration may actually concern each of us individually, as well as each country.

Because of this, Science Diplomacy is a multistakeholder field. It is interdisciplinary due to the complexity of the topics it covers and the processes that surround it. It is a multistakeholder field because dealing with it requires the involvement of all actors. Due to this complexity, together with the fact that this is a new area, Science Diplomacy is especially interesting and important.

This course gave us the opportunity to work with people from different countries, with different backgrounds and perspectives. Working with the participants provided an opportunity to look at

things from a different angle, to learn something new and to have fruitful discussions. This course was useful for all – participants and lecturers/facilitators.

All participants are now aware of the fact that both scientists and diplomats should have their place in international cooperation in this field that concerns the entire planet. Scientists should help diplomats understand the complexity of research and scientific results, and diplomats should involve scientists in decision making processes.

Anticipation of future science policy interactions

Marga Gual Soler

As the world is experiencing breakthroughs in science and technology, such as advanced AI, genome editing, quantum computing, or synthetic biology, at an unprecedented pace, the mandate of Geneva Science and Diplomacy Anticipator (GESDA) is to accelerate the use of the opportunities and avoid their undesirable consequences. This will require rethinking and reorganising the complex relationships and interactions between scientists, politicians, diplomats, entrepreneurs, and citizens, whose agendas, worldviews, mindsets, experiences and responsibilities are all very different, and sometimes contradictory, as demonstrated by the COVID-19 pandemic.

Thus, GESDA's module on 'Anticipation of future science policy interactions and challenges' explores new frameworks that will be needed for global governance, multilateralism, and anticipatory science diplomacy in a world increasingly shaped by exponential technological advances. The module is adapted from the GESDA 'Science Breakthrough Radar' and the GESDA 'Scientific Anticipatory Briefs' (GESDA, n.d.,a); (GESDA, n.d.,b).

The module first introduces three fundamental questions:

Who are we? What does it mean to be human in the age of robots, gene-editing, and augmented reality? New scientific discoveries are radically changing the nature of how we perceive ourselves as human beings. Advanced synthetic biology and gene-editing techniques have the potential to modify the biological fabric of our bodies. Advances in cognitive neurosciences, brain-machine interfaces, and neural technologies may provide access to our inner thoughts in the near future and allow others to steer our behaviours. The power of quantum technologies and advanced artificial intelligence might provide new understandings of consciousness and the origins of life.

How are we going to live together? Which deployment of technology can help reduce inequality and foster inclusive development and well-being? Research on ageing might extend the lifespan of people and raise new questions about equitable access to science or the intergenerational contract of our societies. Advanced AI might lead to further automatisisation and fundamentally change the nature of labour and political participation.

How can we assure humanity's well-being while also sustaining the health of our planet? How can we supply the world population with the necessary food and energy, and still regenerate our planet? Advanced biology combined with quantum computing might provide solutions to poor health or hunger. Well thought out deployment of technology can help reduce inequality and foster inclusive development and well-being.

After this, we looked at two concrete examples for the need of anticipatory Science Diplomacy: first, human augmentation, and second, eco-regeneration and geoengineering, before reflecting upon the future of Science Diplomacy and the new tools that will be needed for its practice and applications.

The final section also addresses the ethical challenges of anticipation and the challenges for the future of multilateralism.

The course participants grappled with the dilemmas posed by scientific and technological advancements and the balance between opportunities and risks. This dialogue should be continuously encouraged between the scientific and diplomatic communities, because as these breakthroughs are made, it is not possible to know today how they will synergistically interact or converge. It is very hard to anticipate exactly what the near and longer-term challenges are going to be.

Participants highlighted the enormous challenge we face in the science-policy dialogue about how to shape technological development towards positive outcomes. For example, how to manage the undesired societal impacts and risks of allowing certain technologies to move forward, while not stifling innovation, and leaving no one behind. Who decides what is beneficial and for whom? How do we create a joint language and start the broader societal and political debate around these emerging topics in relation to fundamental and existential questions?

While this module focuses on advances in environmental, biomedical sciences and technological innovations, it is equally important to consider cutting-edge thinking and to anticipate developments in social science and the humanities. Charting issues such as future social innovations and social structures, advances in international relations theory and geopolitics, or innovation in economic thought, alongside more 'technological' breakthroughs, will create a comprehensive vision of a future and provide the information needed to anticipate and design positive solutions for humankind.

Science Diplomacy and the SDGs

Pavlina Ittelson

The idea to create a course on Science Diplomacy was sparked from a conversation with Amrita Banerjee, the then coordinator of the newly established NSPN Science Diplomacy Exchange and Learning (SciDEAL) Program. It was clear from the start that the goals of the SciDeal Program to give early-career scientists an opportunity to be involved in Science Diplomacy, and Diplo's goals of cross-sectoral capacity development, were an excellent match. Soon after, Diplo engaged five fellows, all scientists, to begin what would become our Science Diplomacy course. Nine months (and one baby) later, we welcomed the first cohort of participants.

When we sat down to hash out the course details, it was clear that there was a need to better understand the link between science and the UN sustainable development goals (SDGs), as well as for wider adoption of evidence based policymaking. This was especially important for small and developing countries, as their exposure to this subject still needs to be built up.

The second module of the course which I presented dealt with the SDGs, specifically with their shaping over the years, current standing, and the fora within the UN system where they are deliberated. The purpose of this module was to give the participants a general understanding of the SDGs and provide a framework to delve deeper into the individual topics in the latter weeks of the course. The participants jumped right into the discussions on achieving the SDGs, focusing on leaving no one behind, the reality check that the pandemic brought, and the role of science as both a source of solutions and a catalyst.

Through interactions like these, participants were challenged to explore and expand their boundaries of knowledge and understanding. With such training, they may themselves become a bridge between science and diplomacy. As the instructor, I consider the interactions between our participants, all from different backgrounds, professional experience, and different parts of the globe, the most rewarding part of teaching. I am glad that the fellows and participants felt the same.

In the time since we first started to draft the outline for the course, the role of Science Diplomacy has only grown in importance. Environmental challenges, health, food security, and water safety all benefit from greater Science Diplomacy engagement. The same is true about achieving foreign policy goals. For this reason, I look forward to welcoming future participants onto our course.

Reflections on teaching science-policy engagement

Maxime Stauffer and Nicolas Seidler

Our module teaches participants how to navigate the interface between science and policy. We aim to give a realistic view of the challenge and ground participants' reflections on their realities.

Science-policy relationships in the 21st century occur within a complex interplay of cognitive, social, and institutional forces. The reasons that scientists and policy actors succeed in informing each other's work are the same as the reasons that they fail: values, language, culture, and organisational priorities shape their behaviour. When they align, it works. When they don't, it fails. As such, the use of science in policy is not only a question of finding and using information. It is also a question of building trust and finding alignment between many heterogeneous actors. Such alignment does not happen in a vacuum but within a context often constrained by political and time pressure, as well as interpersonal and networking skills.

Understanding and navigating the interwoven dynamics of science-policy engagement can be a daunting task. In this module, we break down this complexity and provide a vocabulary and solutions to navigate this reality pragmatically.

The approach we employ in the module goes back-and-forth between letting participants reflect from their point of view and getting them to step back and think about the bigger picture. We start with case studies where participants take on the role of a policy adviser or a researcher and need to explain how they would build a scientific task force or change their approach to science advice. Participants thus identify science-policy challenges based on their intuitions and reflections. Then, we step back and provide a vocabulary to name these challenges and solutions to overcome them. After that, participants apply such knowledge to their careers in a reflexive essay. Lastly, a final session allows participants to share their reflections with others, thus encouraging cross-pollination.

The shift from the big picture to participants' careers is challenging to negotiate. We accompany the participants' journey by recognizing the role of 'boundary-spanners', which they play in their respective contexts. This is a role that is increasingly necessary and sought after in order to connect the dots of science and policy towards science-informed solutions to global challenges. This is a role that equips participants with skills and responsibilities to hone in the future. And most importantly, it provides a strong sense of hope: they are not alone trying to span boundaries, and there is a body of practice that can inform their work. As such, our module aims to give participants more agency and a strong belief that navigating the science-policy interface is not only essential, but also possible.

Reflections

from

**the NSPN SciDeal
programm fellows**

Science Diplomacy and health

Sona Chowdhury

The cataclysmic events of the past two years – the devastating COVID-19 pandemic, raging forest fires because of climate change, alarming vaccine inequity – got me seriously thinking about how to use my scientific knowledge for public good.

During the COVID-19 induced lockdown, I wrote an op-ed in the San Francisco Chronicle urging my peers in the scientific community to become ‘social media influencers’. Distressed by the misinformation and disinformation rampant on social media about the coronavirus, I volunteered my services as part of the NSPN (National Science Policy Network) & FAS (Federation of American Scientists) team in "Ask a Scientist", an interactive tool to help answer the public's questions on the COVID-19 virus.

However, I was not satisfied. I wanted to reach out to a larger audience as I believe that science plays a pivotal role in solving global challenges pertaining to global health, loss in biodiversity, social injustice, and health injustice through better policy decisions based on sound scientific knowledge. So, when I got to know of this Diplo initiative, I was excited. Diplo's online course on Science Diplomacy was an ideal opportunity for me to contribute to creating scientific resources, while at the same time learning about Science Diplomacy and cooperation.

I was also enthused by the aim of the course, which is to bridge the gap between scientists, diplomats, staff of international organizations and solve global issues through the practice of Science Diplomacy. I was subsequently selected to write a module on how Science Diplomacy can be put into the service of sustainable development goal (SDG) 3 on good health and well-being. This, I realized, was one of the means for me as a scientist to make a difference on a larger scale.

My expertise in infectious diseases and vaccinology was an added bonus in designing the module and generating content for it. Incidentally, the importance of SDG 3 became more relevant in the midst of a global pandemic. The significance of prioritizing health at an individual, local, state and global level could not have been more apparent. This made the module dynamic as participants were seeing firsthand the intersection between health and diplomacy.

In such a scenario, SDG 3, quite appropriately, was at the forefront of the UN sustainable goals. The course participants got to understand in real time the importance of COVAX (COVID-19 Vaccines Global Access), and how governments and non-profit organizations interact. By assiduously tracking current developments and global news, participants could see science and diplomacy in action, such as negotiations between the World Trade Organization, and countries of the Global North and South regarding COVID-19 patent waivers.

One of the most memorable moments was during our online class discussion, regarding vaccine nationalism and vaccine inequity. We heard that less than 0.9% of the population in Uganda was fully vaccinated, while people in the USA were receiving booster shots. In the same class discussion, we

also heard how Taiwan was getting vaccines from different sources to overcome the difficulty of obtaining vaccines. Discussing these examples brought home to the group the enormous inequity in vaccine availability.

Although humanity is at this juncture confronted with a double crisis, a global pandemic exacerbated by the war in Ukraine, I am still optimistic. It has been heartwarming to see Ukrainian scientists being invited by scientists from other countries so that they can continue their research.

I am hopeful in the face of adversity, as I have come across like-minded people who want to use their skills in science policy to mitigate global challenges to benefit humanity.

Climate change through the Science Diplomacy lens

Tara Illgner

From the moment that I learned about Diplo's mission of supporting the United Nations' (UN) sustainable development goals (SDGs) through stronger science-diplomacy coordination, I knew that I wanted to get involved. The experience did not disappoint. Creating a science-diplomacy course with other passionate and knowledgeable scientists from different fields under the guidance of experts in international diplomacy, Katharina Höne and Pavlina Ittelson, was thought-provoking, illuminating, and enjoyable. The different modules covered global health, renewable energy, climate, and ecosystems respectively, and were each written by a scientist with expertise in that topic.

The collaborative objectives of this project spoke to my own personal and professional priorities, as a scientist and as a citizen of the world. With an international upbringing, spanning four states and three countries, I understand the interconnected dependency of our global community. Witnessing devastating pollution and flooding in the developing world during my formative years highlighted the urgent need to protect society from preventable disasters by reaching across divides. Having family across the globe, I view international cooperation as indispensable to producing equitable, constructive, and durable solutions to our shared challenges. Our team's collaborative sessions provided an exchange of valuable perspectives and improved our knowledge, assumptions, and communication styles.

While weaving my atmospheric and climate knowledge together with the history of international environmental efforts for this module, I was able to gain and share new insights into the history of science-diplomacy including its successes and set-backs. Particularly, delving into case-studies of regional climate efforts for the training module provided our team and the course participants with concrete examples of achievable climate progress through science-diplomacy. It was especially gratifying to observe participants engaging with the module text as they shared many valuable and relevant insights from their own regions and experiences.

Going forward, I hope to continue building on this work by remaining involved in the science-diplomacy and science-policy interface. Unprecedented challenges such as the current global pandemic and the climate crisis are glaring examples of the urgent and consistent need for 'science in diplomacy' for our shared well-being. While past educational and professional systems have separately siloed science and diplomacy work, I hope that this project has strengthened the science-diplomacy bidirectional pipeline for the module authors and course participants.

As an atmospheric scientist, I am particularly aware that the earth is a closed system, meaning that any perturbations to the climate balance will affect the entire globe. This means that the climate crisis is a shared challenge that requires an immediate, sustained, unified, global effort across professional expertise, international boundaries, and political divides, for generations to come. Navigating these disparate perspectives will require skilled professionals who are trained to work at the science-diplomacy interface.

The collaborative project of producing this science-diplomacy course and its modules has invited the expertise of scientists into the diplomatic conversation, while also providing participating scientists with insights into translating relevant science into useful, timely, and targeted language to reach the intended audience. I believe that the experience that our team and participants gained through the collaborative effort of producing and sharing this training module on climate change will strengthen public trust in science and our collective contributions toward the interrelated objectives of the UN SDGs.

On dealing with uncertainty

Ryan Haupt

What is Science Diplomacy? This was the fundamental question I was hoping to answer, and then help answer for others, by volunteering to be part of this initiative. I've got some bad news because I still don't have an answer, but this bad news is actually a good thing! In teaching complex subjects I feel that it is only natural that the teacher learns from reviewing and presenting the material and expands their understanding from there based on discussions and feedback from their students. In that sense this experience totally delivered!

Is Science Diplomacy how we apply diplomatic relationships to international scientific collaborations? Is it how scientific knowledge can be applied to international decision making? Is it how scientists themselves can serve as diplomatic actors outside the traditional diplomatic framework? Is it a context-dependent bit of all three? Something else entirely?

I think many folks would be frustrated by the lack of clarity here but if there is one major overlap between the scientific mindset and the diplomatic mindset, I think it has to be that both worldviews are trained to be comfortable with uncertainty and with context-dependent definitions of sensitive topics. How cool is that?!

I'm truly not being sarcastic here, as a scientist with some policy experience, it shouldn't be surprising to me that in learning more about a given topic I also learn that the topic itself is far more complex than I may have realized before digging deeper (see the Dunning-Kruger effect for why this pretty much always happens when learning about a new topic and also why it is more or less impossible to avoid).

So, I came into this process hoping for answers, hoping to apply my time doing domestic science policy work to an international framework, and left with a new appreciation of the specific challenges faced by diplomats especially as they relate to issues of science and international collaboration. If only there was a species-level threat to our very existence that could serve as an ultimate and existential test of all of the definitions of Science Diplomacy presented above? Turns out there is! Good news, I guess?

While only explicitly addressed in goal 13 in the UN's sustainable development goals, it becomes immediately obvious upon reviewing the other goals that tackling the global threat of climate change is essential to continuing life on earth as we know it, and addressing that threat will put Science Diplomacy front and center. It is only through a combination of sound science, effective scientific communication, and engaged diplomacy that leads to domestic policy action across a wide variety of stakeholders that we have any hope of tackling the life-threatening imbalance of carbon dioxide currently in our atmosphere because of unmitigated burning of long-sequestered fossil fuels since the industrial revolution. Sounds a bit hopeless, no? Not so! (We hope.)

The participants who took this course are the folks who are going to get that international component done if anyone can. I was thinking we were going to have a group of folks who needed a lot of help with the science basics as they developed their diplomatic skills but instead we had rock stars who really got it, spoke intelligently about every issue presented, and were able to make connections to the topics presented both to their home nations and abroad, showing even in the earliest stages that they had the makings of the exact kind of people we need to tackle the biggest scientific problems facing the international community and therefore the world. And maybe after that they can come up with a good working definition of 'Science Diplomacy' too, no big deal.

Science as a process

Levi Helm

My journey to becoming a scientist started, like many, with curiosity. I wanted to understand how the world worked and I naively believed that if I could understand, then I could make the world a better place. The world is, however, a bit more complex than that. Simply knowing something is only part of the way to a solution. We may 'know' that deforestation is occurring at a rapid rate, but how do we solve this? We may 'know' that climate change is occurring, but who should pay the costs to mitigate it?

With this more nuanced realization, I began to explore science policy and Science Diplomacy as potential career paths after my PhD. Over the past year, I have been fortunate to work with Diplo to develop a module for their new course on Science Diplomacy with a focus on sustainable development.

To me, the central challenge of creating the course was communicating science in a way that is useful for diplomatic practitioners. Science is a systematic process for understanding the world. Diplomacy is a process of interaction and negotiation between states. Both are necessary for addressing sustainable development, but how?

When scientists practice science, they are often interested in the claims being made, and the evidence for those claims. Does the evidence match the conclusion proposed by the scientists? Scientists are interested in the assumptions that go into the research, and how they affect the final conclusions. This is how I have been trained to think like a scientist, and it is an incredibly valuable skill – for a scientist. Diplomacy, however, requires other skills. Knowing the quality of the research, and the strength of the conclusions can tell me how good the information is, but it tells me nothing about what I should do about it. Scientists could provide estimates about what could happen in the future, but which scenario is the most desirable is a matter of values.

I found that in my initial attempts to create the module, I focused on teaching science like a scientist – the theories behind what we know – but I quickly found that this was not working. Knowing all the scientific minutiae that are used to produce information would just put diplomats in the same position as scientists: knowing information, but not being able to act on that information. The other end of the spectrum would be to only teach the conclusions, to teach diplomats a collection of scientific trivia about the world. But this is also problematic. For sustainability, there often isn't just one scientific answer, as different scientists with different perspectives reach different conclusions.

In my module, I decided not to discuss what science does, or provide a collection of scientific trivia. Instead, I discussed the process of science, and then what diplomacy can do with the information produced by said process. So, instead of listing information that we learned from science, to discuss science as a process of producing information. To me, this distinction matters.

If we are to make progress on sustainable development, we need to be able to measure that progress – this is a matter of science. Diplomacy practitioners do not need to know exactly how these measurements are made. They do, however, need to know the implications of what they mean (and what they do not mean). I hope this more nuanced perspective can lead to just and equitable science-based diplomacy in the future.

Apart from the intellectual joy of creating the course, I also personally enjoyed the collaboration, and I am inspired to keep working at the intersection of science and diplomacy as I further my career!

An enormous learning experience

Nikita Lad

As an international student in the United States, I always knew the importance of diplomacy in ways that facilitate and promote safe passage for students to gain knowledge from all over the world. I was introduced to Science Diplomacy through the National Science Policy Network (NSPN) and realized that my scientific expertise could be used in several other ways, such as to frame or inform the policymaking process or to advise diplomatic decisions.

Through NSPN, being placed at Diplo to work on an online course felt surreal. Diplo's vision for creating a Science Diplomacy curriculum that could be accessed by all attracted me, and the fact that I could contribute to such an endeavor was beyond my belief. However, Katharina Höne and Pavlina Ittelson's encouragement and approach to the process instilled confidence in me and made me realize my strongest possible contributions.

As the course addressed sustainable development issues, it aligned very well with my passion and competence. Thus, developing modules based on each scientist's expertise and interacting with the course participants was an enormous learning experience. I understood the importance of viewing issues from Global South and Global North perspectives, as well as the various diplomatic terms and treaties that shape most of the decisions. I was also able to meet some highly proficient and dignified people in the field, thus making meaningful connections for a lifetime.

Hearing their comments on the prepared material and understanding each person's point of view based on their lived experiences was a revelation. I am glad that I got to be a part of such a community, even beyond the course period, and contribute towards imparting Science Diplomacy. A big thank you to NSPN, Diplo, the course partners, and participants for an experience worth cherishing.

Reflections

from

course participants

Science as a game-changer for the African continent

Souhila Amazouz

Science is a game changer for nations today, as more and more countries are adopting science as a tool for modernizing their economies and a means to monitor their development. It contributes to the formulation of well elaborated, evidence based and transversal policies that rely on relevant data and research, knowledge, appropriate methodologies, and monitoring systems to build certainty and trust around the policies themselves, as well as around the expected outcomes and socio-economic impact.

Science diplomacy can be described as the interaction between the latest tendencies, marked by the increasing integration of emerging technologies and the automatization of almost all fields, and political debates surrounding each area, namely what affects living together and the future of humankind on earth such as climate change and pandemics.

As an expert working in the field of ICT&Digital for an Intergovernmental Organisation, namely the African Union Commission, this course relates to my day-to-day work. It helped me to have a better understanding of the central place of science in contemporary economy and society and the link between technology and state affairs.

The knowledge I obtained in this course will support my work towards building political awareness of the growing importance of Science Diplomacy as well as the urgent need for African countries to incorporate science in policymaking processes, including foreign policies. This is due to their interlinked nature, and that they have a direct impact on their economies as well as on national ownership and security.

More than ever before, the African continent is looking towards harnessing the potential of technology and science to address some of its lasting security and development issues. Indeed, aspects related to energy efficiency, climate change, health, satellite observation and responsible use of natural commodities are of special interest and therefore Science Diplomacy is an indispensable tool for bringing countries together to take informed decisions that safeguard both national and collective interests, positioning Africa as a strong partner in the global economy.

With regard to the knowledge acquired in this course, the starting point for me would be facilitating policy dialogues between the diplomatic and scientific communities as our countries cannot afford to continue working in silos while the world is moving very fast with new concepts and new thinking on global issues.

Another priority is reaching out and engaging African native scientists and incentivising them to share their expertise and put it at the disposal of their populations. The third point would be to advocate for the extensive use of science to ease negotiations and build trust among states.

I would recommend this course to policymakers, scientists and diplomats as it is a good platform for exchanging views and experiences from different perspectives and also an opportunity to build the Science Diplomacy community that will contribute to solving transnational problems, anticipate changes that may come in the future, mitigate risks, and prevent inter-state conflicts.

Most importantly, it will give the ambition to speak the same and adequate language to embark our governments upon up-to-date and forward looking policies and approaches that preserve life and peace on our planet.

Science Diplomacy and planetary health: A medical practitioners' perspective

Katharina Beyer

'Bringing actors together that belong to different social worlds' very well describes a significant part of my work as a medical doctor (MD) in primary care and emergency medicine. Being an MD means navigating between scientific knowledge, investors and economists, politicians, insurance companies, and of course the patient. The emergency department is an intersection of different disciplines with an uneven workload and a mix of patients. Managing it requires an approach where parties can give advice, are listened to, and are included in decisions.

In general, 'science in diplomacy' is most relevant in my working context. The COVID-19 pandemic has brought some 'diplomacy for science' (cooperation between otherwise independent and occasionally competing structures for scientific needs).

Until now I have applied Science Diplomacy mainly at an informal and national level. Working in different cantons in a country with a federal health system and in different types of institutions (university hospital, regional hospital, GP consultation in rural areas, rescue organizations) at the same time, I played the role of mediator between the different institutions, their policies within a canton, or in-between cantons, including the French-German language barrier, or between rural and urban settings.

In the context of the COVID-19 pandemic, I closely follow the scientific news, which does not always help to reduce uncertainty, and can raise more questions or doubts. However, I also depend on policymaking, for example at the beginning of the pandemic on testing strategies, and now on vaccination schemes. At cantonal or national borders, it has sometimes been a challenge to explain certain realities to patients. Misfits at the science-policy interface are part of my daily life. After an initial high interest in trying to solve some of the misfits by 'boundary spanning' and better communication skills, the radicalization of part of the society and a certain inaction within politics (partly motivated by the first problem) made me feel a bit resigned.

Regarding future Science Diplomacy challenges, those regarding neuro-rights are particularly relevant for my work. I am regularly confronted with the fine line between benefit and misuse, for example with regard to the opioid crisis within the ethical dilemma of pain-management. This is especially true when it concerns the central nervous system. I am aware that regulations that do not prevent technical progress or withhold cures from patients are necessary.

As for how I plan to incorporate Science Diplomacy in my work in the future, I am considering investing more into 'boundary spanning' and knowledge brokering, as well as reflection on future challenges. Witnessing climate change firsthand working in ski resorts, whilst studying the effects it can have on health, motivates me to do more in the domain of planetary health.

Representing the EU in China

Vojko Bratina

With an educational background in science, and after having worked for more than ten years as a researcher in the domain of space technologies, throughout the last 15 years I have been working in EU Institutions on the implementation of EC research policy. I therefore have a wide experience of EU Research Policy Programmes. My duties covered both implementation and policy aspects.

Since October 2019 I have been temporarily assigned to the EU Delegation to China as S&T Attaché, where my experience is transferred into the realm of Science Diplomacy. Here I can utilise my knowledge of EU institutions and of the decision-making process, acquired over 15 years of experience with the EC and its Executive Agencies.

Science diplomacy is an integral part of my work, having to deal daily with relations between the EU and China in the field of research and innovation. This has been particularly challenging in recent years, when these two global regions started rebalancing their diplomatic relations and their scientific-technological cooperation.

The main objective of my job is to facilitate STI cooperation between the EU and China. As international cooperation in science is multilateral, the strategic interest of the EU in strengthening scientific cooperation with China is therefore to enforce the participation of China in multilateral undertakings supporting scientific cooperation at an international level. At the same time this ensures a continuation in the international relations between the two regions, in a period of difficult discussion and negotiation.

‘Diplomacy for science’ and ‘science for diplomacy’ are the two main categories of Science Diplomacy that are particularly pertinent to my work. Cooperation between two big scientific powerhouses like the EU and China is particularly important when tackling global challenges like climate change, food security or a global pandemic like COVID-19.

These issues cannot be solved unilaterally, and it is important to set common goals to achieve results that might have mutual benefits for both sides. This can be achieved through suitable intermediation that facilitates international cooperation, and it is in line with ‘diplomacy for science’.

The international character of science also brings the opportunity to have open dialogues between the EU and China involving the research communities in science and research, especially in fundamental research, where common ground can be found more easily. Widening international engagement of the research communities also brings an improvement of international relations, at least in the field of science and research.

Researchers involved in international multilateral projects ensure a sort of smooth continuity of relations, even in times when the discussion at a higher political level encounters several difficulties,

often being put on hold. Science is often one of the open channels when diplomatic relations are disrupted. Here is where the 'science for diplomacy' dimension finds its place.

My personal and professional perspectives in the field of Science Diplomacy will most probably build on my current professional experience, and the opportunities given by it, by engaging more deeply with Science Diplomacy issues through working practices and learning insights. Investigating the Chinese innovation ecosystem could for example enhance my knowledge on future strategy in the field of technological development. This also has crucial implications concerning future technological supremacy, which is of high interest to specific EU foreign policy objectives.

Science Diplomacy and Internet Governance

YingChu Chen

Economics is a social science which concerns how an individual or a group makes decisions and improvements. I work in an economic research institute, and I address internet governance, compliance, and human rights-related issues in my job. The fundamental dimension of those issues is how people or governments make decisions and govern the internet and communication.

Disinformation and rumors are critical issues in internet governance and related areas. Those issues also relate to fair competition in the market. My job concerns how to educate and encourage people to have awareness and discern which evidence can be trusted, and to understand where and how to find accountable evidence from a trustworthy organization via the internet. I also help people and organisations in the private sector to stop disinformation by building a healthy and competitive market.

In the Science Diplomacy course, attendees discussed science literacy. Science literacy should be built with evidence-based concepts. Without science literacy, people may not know how and where to find the evidence to support information. For example, many people like to eat supplement food and believe in folklore therapies or herbal medicine.

They don't believe doctors with medical training, but they trust messages in their SMS apps. Some people die or get diseases because they would rather eat unknown herbal prescriptions and refuse to accept medical help from doctors. We can also talk about digital and media literacy capacity building for general internet users. We should encourage science literacy so that people will know how to identify disinformation on the internet.

The internet can spread rumors and disinformation quickly. Because of a lack of science literacy, people believe in misleading information easily. People may take some supplement foods on the basis of the brand and marketing by pharmaceutical companies. Consumers don't know how to assess advertisements and marketing videos. They may listen to a friend or relatives and take too many pills in their daily life. They may search for a document to support their perspective without assessing the evidence.

The internet governance forum is similar to the diplomacy area. When I attended the meeting, I listened to people present their theories. Their statements were full of passion but they need more evidence to support their argument. As in statistics, we need to understand whether the sample is representative. Also, we need evidence to support the statement, not only information from your friends or some other untrustworthy internet media. It would help if you had a trustworthy diplomatic strategy in negotiation.

I read the G7 meeting report in the United Kingdom in 2021. They believed data localization would be a barrier to free data flow, but they need to collect evidence to prove that. They will discuss building a framework for cross-data transmission to help to grow the data economy. I had used

endogenous growth theory to explain that data interoperability is essential to the internet and the digital economy and may bring a positive network externality to the prosperity of the internet economy. The experience taught me a correct and influential theory. I think that this is a 'science for diplomacy' issue in internet governance. So, the concepts discussed in the Science Diplomacy courses are already in real life.

The Science Diplomacy course proves how important it is to know the concept, to have trustworthy information resources, and to be careful to make evidence-based statements.

Boundary spanning successes and challenges

Encieh Erfani

I am a scientist and I work as an assistant professor in academia with no background in diplomacy. However, I consider myself a 'boundary spanner' since I am involved in several organizations in which Science Diplomacy plays a major role.

I am an executive committee member of the Global Young Academy (GYA) which is an academy for early career researchers (ECRs). Young scientists have their own challenges and the GYA gives voice to ECRs. Some of the challenges are as follows: The GYA as a partner of the International Science Council (ISC) and InterAcademy Partnership (IAP) gives advice in science policy decisions to consider these challenges.

The EC members are the voice of members in several high-ranked meetings like the World Science Forum, Science and Technology in the Society Forum, and UNESCO meetings where Science Diplomacy happens.

The GYA also supports the establishment of National Young Academies, especially in developing countries. On the other hand, the GYA has working groups on Science Diplomacy, science advice, science communication, and open science to engage members in these topics. Several studies have been done at GYA, for example on the situation of ECRs in ASEAN, Africa, and Latin America, the effect of COVID-19 on ECRs, the situation of mother scientists, and trust in science.

Recently I established the SDG incubator at GYA to focus more on these goals and the role of ECRs to achieve them. The promotion of this incubator was the topic of SDGs during the course since I realized that most of the scientists, especially the ones from developing countries, are not familiar with SDGs and the potential of their research to achieve them.

I am co-chair of the "Preservation of Science" task team of the "Science in Exile" project of TWAS/ISC/IAP. The goal of the project is to support at-risk, displaced, and refugee scholars. In this project, I practice 'diplomacy for science' and I find it challenging to negotiate support for scientists. One of the main projects that I am involved in is to rescue Afghan scholars. Here taking a decision under uncertainty is more clear since the situation is critical and it is not obvious the decisions that we take will be successful in action.

I am the only female on the board of directors of the Astronomy Society of Iran (ASI) and I recently established its female branch. The evidence shows clearly that females are in the minority in STEM, however in most of the developing countries there is no policy to remove this inequality. Indeed gender equality is one of the goals of sustainable development and for achieving this we need to empower females. That is the reason, despite several challenges, that I established the female branch of the ASI to give voice to Iranian women astronomers.

The techniques I learned during the course helped me to use scientific facts in negotiation. Despite the fact that in traditional societies even scientific facts are not accepted science can still help to open the conversation.

I take political decisions in my ordinary life, however in my career as a scientist, the decisions can affect my students, colleagues, and my institute. So learning Science Diplomacy helps me to make decisions that are a greater benefit to science.

Science Diplomacy's Potential for the Protection of Cultural Heritage and the Prevention of Illicit Trade

Aura Fossati

Science, foreign policy, and politics may seem distant concepts and environments, even more in some peculiar areas of research, but they are indeed harnessed and interconnected in most academic disciplines. As an archaeologist and a specialist in the protection of cultural heritage (CHP), my work involves research fieldwork abroad and focuses on cross-bordering issues and global challenges, such as the illicit trafficking of cultural goods or the role of cultural heritage in achieving the SDGs. Scientific research stands alongside international relations, and Science Diplomacy is part of this professional framework, explicitly or implicitly, both at the bilateral and supranational level.

Dimensions of application: a personal experience

As the scientific director of the Italian Archaeological Mission in Mexico (coordination: Centro Studi Americanistici Circolo Amerindiano, Italy), I operate in a very international collaborative setting, which became a joint Italian-Mexican research project as part of an international development cooperation programme, funded by the Italian Ministry of Foreign Affairs. Therefore, the 'diplomacy for science' dimension (Royal Society, 2010) is key and embassies in both countries are fundamental to facilitating the implementation of the project and the negotiation of related cooperation agreements.

The science attachés represent considerable support for the promotion of research findings and the enhancement of the collaboration between the two countries. The diplomatic apparatus is also essential for assistance with security questions, due to the sensitivity of some issues related to the project. I am also involved with the NETCHER Network, a former Horizon 2020 project led by a consortium of European partners and coordinated by the French National Centre for Scientific Research. It aims at developing collaborations to address the illicit trafficking of cultural property, establishing good practices and supporting evidence-led decision-making at the European level (e.g. European Commission). Even if we recognize the 'science in diplomacy' dimension in this framework, it would be worth taking advantage of specific Science Diplomacy mechanisms that have real potential for the CHP.

Indeed, cultural heritage safeguarding is a common issue that is gaining increasing attention in foreign policy agendas. It has become a priority for the European Union, and the European External Action Service recently included it in the EU foreign policy toolbox (Council of the European Union, 2021a, 2021b). In this context, international cooperation, a deep understanding of the related phenomena and, hence, scientific research is essential to developing adaptive solutions, as well as effective policies and regulations.

However, a lack of coordination among the different stakeholders (national governments, IOs, NGOs, academia, non-sector actors – i.e. the international art market), a gap between the scientific

community and decision makers (and misfits such as misalignment and miscommunication) undermine mutual understanding, trust and the integration of scientific evidence in the policy-making process.

Strengthening the connection between CHP research and informed policymaking

In this regard, Science Diplomacy offers different possibilities that we should incorporate in the development of future strategies and action plans. Given the multitude of global challenges connected to the protection of tangible and intangible cultural heritage (illicit trafficking, sustainable socio-economic development, climate change, biodiversity loss, security and stability), it is important to create a tailored framework for facilitating international scientific collaborations, which can also represent the opportunity to improve challenging international relations (e.g. joint research and heritage protection actions represented an informal peaceful connection between Israel and the United Arab Emirates before the Abraham Accords in 2020).

Mechanisms to foster science-informed policymaking are very relevant in our context, for instance supranational advisory networks or intergovernmental platforms, on the model of the Intergovernmental Panel on Climate Change, can provide a meaningful space for knowledge sharing and interaction to foster the science-diplomacy nexus (Ruffini, 2018). Bringing scientific data to the negotiation table and, almost more importantly, ensuring that the information is understandable and useful to all stakeholders can improve trust building and constructive dialogue to develop future impact-oriented responses.

Science Diplomacy for Open Science

Patrick Furrer

Science Diplomacy applies to my own work establishing the national Open Science program 2021-2024 in Switzerland during the last 4 years. I have been collaborating within the Council of National Open Science Coordinators (launched in 2019), which is a typical example of 'boundary spanning' within an informal network around Europe. For instance, some members of this network are engaged within ministries in their home countries, whereas in Switzerland the representatives are swissuniversities (the swiss national rectors conference) and the Swiss National Science Foundation.

The question of 'officializing' this network appeared during our first informal meeting in Finland in 2019, where the council was kicked off and its first committee elected. The European Commission representative for Open Science attended this first informal meeting too. I took that opportunity to ask him whether the establishment of a 'National Contact Points (NCP) for Open Science' was on the agenda of the European Commission for Horizon Europe. The EC has established a system of NCPs for different thematic areas as well as transversal issues (Legal NCP) a long time ago, and has developed it over time mostly on transversal dimensions (e.g. for Marie-Sklodowska-Curie Actions or for European Research Council). Extending this network by officializing an 'Open Science NCP' would have strengthened the role of the EU as leading the Open Science agenda at a global level.

This question carries the three dimensions of Science Diplomacy. First, introducing this new element within the NCP system would have a very important impact on 'science in diplomacy'. Especially with the advent of the UNESCO Open Science recommendation, such a measure would allow the strengthening of the involvement of the scientific community in developing national policies in response to these recommendations.

Once established and funded by the member states and the associated countries, Open Science NCPs would benefit from EC funding to cooperate in a so-called NCP project. Such networks as NCP projects have been instrumental in the past within several scientific disciplines, as NCPs play a key role in supporting the efforts of 'diplomacy for science' via cross-linking and cross-fertilizing international scientific cooperation among scientists from all over the world. An example I know well is the Ideal-IST network, in which I was responsible for the Work Package 'International Cooperation'. In this context, NCPs span boundaries for the European Research Programmes within the EU as well as outside of EU frontiers.

This network expanded beyond the EU borders, with partners from Ukraine, Belarus, Mexico, India, Morocco, Algeria, and Tunisia, to give just a few examples. Finally, as the Horizon Europe programme now targets SDGs more specifically, for instance within its new so-called 'Missions', the establishment of a transversal NCP covering the Open Science agenda would strengthen the dimension of 'science for diplomacy'.

Contacting the Swiss scientific attaché in Brussels to share this suggestion would certainly be an action that would contribute to Science Diplomacy. A proactive suggestion coordinated by a country like Switzerland highly interested in joining the list of associated countries would probably be worth envisioning at a diplomatic level.

As a freelance consultant, supporting researchers writing proposals for Horizon Europe, I am in a position to influence them (and to relay this influence within my own consultancy network) directly in the future with regard to the necessity to imply Science Diplomacy in their dissemination and communication strategies, to strengthen the key impacts of their project results. Cooperating in the future with GESDA and GSPI would also allow such impacts to scale-up, and to boost my motivation and promote my expertise in scientific integrity and open science practices at an international level.

Science Education in Colombian Diplomacy

Carlos Arturo García Bonilla

As a chemical engineer and a career diplomat, I could see from firsthand experience the clash between politics and science. During my first job as a diplomat, I unified and established the Colombian position regarding health issues at the World Health Organization (WHO). I gathered statements from different Colombian institutions such as the Ministry of Health, the Ministry of Trade, and the food and drugs administration, among others. In the diplomatic world some colleagues think that most technicians do not understand the diplomatic and political aspects of the issues they work with, and that is sadly true.

However, I discovered the other side of the story: most of the diplomats do not understand the scientific aspects of the issues they have to negotiate and deal with, and that is not only sad, but dangerous. That is the reason why I decided to work hard in awakening the importance of Science Diplomacy for diplomats, with a scientific mindset indispensable for doing our work. As an engineer I can help a little bit with that, and as a diplomat I experienced how to extract the best from both worlds.

As part of the Colombian Foreign Service, I have served in different positions abroad. As Consul in Ecuador, Venezuela, and Nicaragua for the last six years, I have had the experience of dealing with many delicate issues that diplomats must address in their daily routines, so I was far away from the academic world.

I recently came back to Colombia, because under the Diplomatic career ruled by national laws, a diplomat must alternate between periods in their native country and abroad. So, when I arrived in Bogota, I asked for a position at The Augusto Ramírez Ocampo Diplomatic Academy, an internal unit at the Colombian Ministry of Foreign Affairs in charge of the training and formation of current and future Colombian diplomats. I had in mind a specific purpose: to introduce science in diplomatic training through Science Diplomacy. Fortunately, they designated me as coordinator for academic cooperation inside the Colombian Diplomatic Academy, and from that position it was possible for me to build alliances with different institutions, for strengthening diplomatic training and getting Science Diplomacy allies that could help in linking both fields.

The Colombian institutional environment could not be better for promoting Science Diplomacy. The current government is working on a national Science Diplomacy strategy intended to become state policy. This particular interest came from the mandate of the so-called “Mission of Sages”, a group of remarkable experts in different fields gathered by the government to think about the future of science in Colombia. They proposed at first the concept of a national Science Diplomacy strategy in 2019 and recently held meetings for following up the implementation of this proposal.

The exercise of Science Diplomacy, nevertheless, is not recent, and it has been used previously as a tool of the country's foreign policy with considerable success. There are three examples in which this

previous exercise of scientific diplomacy is notable: the proposal and negotiation of the SDGs, the negotiation of biosimilar medicines, and the way in which the world drug problem was addressed.

We want Science Diplomacy as a structural pillar of Colombian foreign policy, and we want to put science at the core of the policymaking and negotiation processes, and thus the recent development of a national strategy is fundamental for building state policy in Science Diplomacy. Furthermore, we need to look beyond immediate needs and think about the future.

Relevance of Science Diplomacy in the Caribbean

Petal Punalall Jetoo

Science Diplomacy led me to reflect on aspects of my work through a new lens. Science and diplomacy were creatively applied, resulting in solutions for capacity building and awareness of crucial concepts of Science, Technology and Innovation (STI).

The Caribbean

As Guyana's National Science Coordinator, tasked with the improvement of basic scientific literacy, I engaged the Caribbean Academy of Sciences (CAS) and UNESCO from 2009-2019. As a science academy, CAS supports capacity development and raises awareness for advancing scientific literacy in the English-speaking Caribbean countries through its country chapters. CAS hosts teacher training workshops on STEM and other interactive teaching methodologies to increase interest in science and science careers. UNESCO's Cluster Office for the Caribbean is mandated to create cooperation mechanisms and provide technical support for science policy development and its related programmes in the basic sciences and education.

An evaluation of formal science education at the primary and secondary levels in Guyana revealed several areas for improvement. Antiquated teaching approaches led to limited student interest and participation in the sciences. Limited access to trained science teachers, science laboratories and other related resources directly affected the quality of the teaching and learning process.

A national working group on Science and Technology was established which brought together state actors from the Government of Guyana, the University of Guyana and national institutions along with scientists from CAS and a technical support team from the UNESCO Cluster Office for the Caribbean. With funding support from UNESCO from 2009-2011, this working group developed a national Science and Technology policy. One of the first supporting programmes was UNESCO's introduction of its Global microscience experiments project in Guyana in fifteen pilot secondary schools in 2010. Within three years, microscience kits with supporting teacher and student manuals were used in most of the primary and secondary schools in Guyana. This resulted in the doubling of student entries and simultaneously improved student performance in the pure sciences at both levels. As the project coordinator for this policy development process, I practiced 'boundary spanning'. This type of science-policy interface (SPI) fits the assignment model (Karoneen et al, 2020) where demand driven scientific support is provided for policymakers. The demand in this case was the urgent need to reverse the decline of students' performance in the sciences. I was assigned by UNESCO as the regional project coordinator and training facilitator for the expansion of its microscience programme in six other Caribbean countries through a UNESCO funded sub-regional project.

This was the power of Science Diplomacy at work – a collaborative mechanism in which CAS demonstrated 'science in diplomacy', through its provision of technical guidance and successfully informed foreign policy objectives with science. UNESCO's Cluster Office for the Caribbean

demonstrated ‘diplomacy for science’, facilitating international science cooperation” (Royal Society, 2010, p. vi).

Science Diplomacy at work in the Private Sector

At ASR’s Yonker’s Sugar Refinery, New York, I recently led a Continuous Improvement (CI) project on chemical loss monitoring. A cross-functional team consisting of a Systems Control Engineer, a Chemist, a Sustainability Engineer and two Process Engineers from the Engineering, Quality Assurance and Process departments respectively was assembled. Through the application of lean six-sigma and the Design, Measure, Analyze Improve and Control (DMAIC) roadmap, this team successfully improved chemical loss monitoring – another example of ‘boundary spanning’ and Science Diplomacy at work.

My work demonstrates the application of Science Diplomacy as a powerful multistakeholder collaborative mechanism in policy and programme development and continuous improvement in both public and private sectors.

Developing as a Boundary Spanner

Mouloud Khelif

As a governance and sustainability strategy consultant I deal with organizations' challenges within specific ecosystems. This includes understanding regulatory and policymaking frameworks, to anticipate their evolution and potential disruptions. It also means assessing other stakeholders' roles and contributions (industry associations, academia, consumers and civil society). Environmental, social and economic landscapes are impacted by COVID-19, and pressure to address environmental, social, and governance issues also comes from shareholders and investors (Bell, 2021).

I am not a professional diplomat, nor do I consider myself a scientist. I have some negotiation experience (business and not-for-profit) and part of my background is engineering (MSc). I used social sciences (sociology, economics, organizational behavior) while working as a researcher in strategy and governance.

Admittedly, I struggled to find where my contribution fits in the Science Diplomacy arena. Beyond the hype, no universal definition exists, and it has become more complex as actors' diversity increases. Science Diplomacy is an umbrella term (Rungius et al., 2018) describing a wide range of formal and informal activities 'at the intersection between research and scientific international collaboration and the diplomatic and foreign policy agenda' (Flink and Ruffin, 2019, p. 104). Let's broaden it by not limiting interaction to scientists and foreign policy officials, with non-traditional Science Diplomacy interests such as the private sector and civil society. Then I can see myself in a 'boundary spanning' capacity (Bednarek et al., 2018). Using the course taxonomy, I fall in the "assignment" or "mixed model" category.

'Boundary spanning' plays a valuable role in the current EU legislative landscape: the Digital market strategy and agenda (Bracy, 2021) with the GDPR, Digital Markets Act, Digital Services Act and AI Act, or the EU Green Deal with the recently first Taxonomy Climate Delegated Act. The aim is to reconcile evidence-based approaches with regulatory perspectives on the policy side (precautionary, do no harm).

The AI Act is going through a legislative process with opportunities for stakeholders to be heard. It has been criticized by over 120 civil society organisations (including Algorithm Watch and Human Rights Watch) for not protecting fundamental rights (EDRi et al. 2021). Scientific advice (from neuroscience, social sciences, etc.) is needed to assess AI's promises and perils.

As for climate mitigation and adaptation, the EU taxonomy (European Commission, 2021a) will improve transparency and help investors, policymakers and consumers evaluate businesses' non-financial performance (European Commission, 2021b). This applies to EU domiciled companies with over 500 employees in certain sectors. A Platform on Sustainable Finance with over 50 experts was created by the commission in October 2020 following the groundwork done by a multistakeholder Technical Expert Group on Sustainable Finance (Green Finance Platform, 2020). The taxonomy is the first science-based classification of environmentally sustainable economic activities.

The European Commission is the non-political executive branch of the EU, responsible for initiating legislation and implementing decisions by both Parliament and Council (European Union, n.d.). In real life however, the political interplay is of a different magnitude. Negotiations between member states are complex and highly political, influenced by special interests. Often, industries considered are strategic (energy, financial services, agriculture).

Despite its significant impact on climate change and biodiversity, agriculture is not included in the first EU delegated act, due to its political nature. Another battle (Simon, 2021) decided the inclusion of nuclear and gas activities under conditions.

Going forward, I can contribute as a 'boundary spanner' at the poly-interface between experts, policymakers and corporate actors (strategists or innovators) to communicate interests and capabilities at play. Helping organizations navigate a complex web of relationships and positively influence the science-policy interface means new opportunities for everyone. Addressing a genuine contribution from businesses to the SDGs is crucial, particularly in its environmental, technological and social dimensions.

Reflections on Science Diplomacy: Putting training into practice

Patricia Kiconco

While the relevance of Science Diplomacy (SD) for the challenges of the 21st century cannot be overstated, the practice is itself nuanced and many of its aspects are still unexplored (Höne and Kurbalija, 2018). The recent and increased attention to Science Diplomacy can be attributed to the recognition that science is as much a cause as it is a cure for many of the current global challenges (Turekian, 2018).

In their three-part definition, the Royal Society and the American Association for the Advancement of Science categorized Science Diplomacy as: ‘diplomacy for science’, ‘science for diplomacy’ and ‘science in diplomacy’ (Royal Society, 2010). Under these themes, Science Diplomacy highlights the widening intersection between science and politics across the globe and addresses the science and policy interface (Rungius and Flink, 2020).

To explore this further, we look at the advancement of science and technology and the effect it has had on the world system. The rise in technological systems for societal development and the global interconnectedness of science has undoubtedly changed and enhanced the face of multilateral diplomacy and international policymaking. Additionally, the scientific nature of the causes and possible solutions to the problems of the 21st century calls for constructive international partnerships (Fedoroff, 2009). This calls for science and Science Diplomacy to be placed at the center of global discussions regarding the way forward for world problems and the sustainable development goals (Lord and Turekian, 2007).

The COVID-19 pandemic is the most recent example of a global health challenge. With it, we have seen the relevance of and need for health scientists amplified. There has been a global explosion of scientific collaborations and knowledge exchanges between scientists during this pandemic period. However, the various aspects of life affected by the pandemic necessitated a plethora of actors from different science and social backgrounds to work together, and hence a transdisciplinary approach to the solutions. Knowledge sharing in such contexts allows for decisions that promote growth in science, while at the same time fostering economic competitiveness and societal development at the policy level.

International science collaborations can be harnessed to improve bilateral and multilateral relationships between countries (Rana, 2007). The links forged here, between traditional and non-traditional diplomats enhance the mutuality of benefits between the scientific and the foreign policy communities (The Royal Society, 2010). As a young scientist from a developing country, I can see how this would open more opportunities for training, access to advanced facilities and resource sharing and new careers in low- and middle-income countries (LMICs). This would speed along what Thomas L. Friedman referred to as “the flattening of the world” (Friedman, 2005).

Collaborations can further be used as a platform for training in science leadership, research, science communication and all-round capacity building among budding scientists in LMICs. According to the University World News Africa edition 2017, programmes like the African Science Leadership Program aim to develop science leadership through science literacy and transdisciplinary communication with policymakers and the public.

Through this course, I have been challenged on how to make scientific research relevant to the non-science community and bridging the gap in trust between science and the public. This requires me to move away from thinking in terms of isolated academic research to using science to address current or forecasted community needs. Active involvement of governments in science programmes, as is advocated under 'diplomacy for science', would further strengthen and broaden understanding of the dynamic role of science and technology in decision making, and inspire scientific contribution outside academia.

Science diplomacy at work: UNESCO, Latin America, and the Caribbean

Massimiliano Lombardo

Science Diplomacy could be defined as the art of using scientific knowledge and evidence to deal with complex social, economic and environmental issues of importance to human societies, as well as promoting agreements and cooperation within and among countries.

I consider myself to be a science diplomat. I have a BSc and MSc in Biological Sciences, and more than 20 years of professional experience in international development cooperation (bilateral, trilateral and multilateral) in the field of environment and sustainable development, for three different government agencies (representing Italy, the USA and the UK) and for an international organization of the UN system – UNESCO, which is recognized as an influential institutional actor in Science Diplomacy. Furthermore, I was inspired by the example of my father, a biologist like me, who was a science attaché at the Italian Embassy in Brazil.

Therefore, many aspects of the concept and the practice of Science Diplomacy (especially those within the three categories originally defined by the American Association for the Advancement of Science (AAAS) and the British Royal Society) are particularly familiar and relevant to me. This is because in my professional trajectory I have experienced different perspectives of working with science and diplomacy.

Firstly, working as a volunteer and then as a junior professional officer of UNESCO (in Brazil and in Southeast Asia), I learnt how to use “diplomacy for science”, with a multilateral approach to facilitate international scientific cooperation, mainly in the area of integrated water resources management. At that time, the boundaries between scientists and diplomats were very well defined, and it was generally very difficult to break them, especially within countries.

UNESCO, however, facilitated spanning these boundaries by bringing together diverse stakeholders from different countries to cooperate amongst each other. In this regard, one of my achievements was to convince the Japanese government about the importance of providing financial support to UNESCO to organize technical training courses on applied hydrology targeted to non-scientist government officials (traditional diplomats) of some developing countries in Southeast Asia. As a result, some of those government officials were able to advance the diplomatic relations of their countries with Japan, and, at the same time, they could better engage themselves and other diplomats of their country in regional cooperative initiatives of UNESCO’s International Hydrological Programme (IHP).

Secondly, when I worked in Brazil with the Italian Development Cooperation, USAID and DFID, as a policy advisor and as a programme manager, I practiced much more “science in/for diplomacy”, informing and advising donor governments on how to cooperate and negotiate with the host country (Brazil) on some very controversial issues, such as: conservation and sustainable use of biodiversity resources in indigenous lands of the Brazilian Amazon forest; access and benefits-sharing (ABS);

violence against women and girls; food and nutrition security; international peace and security; and climate change. Working on those issues, generally I needed to defend and promote the views and interests of the donor country, while the 'recipient' country often wanted to affirm its views and interests, which, in many cases, did not take into account the perspectives of civil society and of the local and traditional communities.

Advising DFID in Brazil on the negotiations around the drafting of the 2030 Agenda and the SDGs, and using some diplomatic skills (especially public relations and intercultural sensitivity), I was able to make the traditional diplomats of Brazil and the UK find common ground in cooperating with UN agencies to support social protection and food security programmes in low-income countries in Africa.

Through those experiences, and especially with UNESCO, a 'boundary organization' that works actively at the interface between science and policy, I am becoming a 'boundary spanner' more and more, promoting and supporting cooperation among Caribbean Small Island Developing States (SIDS), especially as regards climate change adaptation and disaster risk reduction.

Most Caribbean SIDS do not see science, technology and innovation (STI) as a priority for their public policies. To this end, I plan to organize national and regional training courses on Science Diplomacy and science communication, which will simultaneously engage government officials and academic researchers, enabling them to use those as tools to promote science uptake and science-informed decision-making, at the national and regional levels, in specific priority areas that promote climate adaptation and resilience.

Using Science Diplomacy to achieve health goal

Désiré Néboua

My attendance of this 10-week high level course on Science Diplomacy with Diplo allowed me to understand how the connection between diplomacy and science can be a driver of progress in several areas related to the sustainable development goals (SDGs). We have seen that engaging in Science Diplomacy requires the implementation of a set of actions and mechanisms, such as the development of robust, efficient, and lasting scientific and technological capabilities, institutional transformations to allow the appointment of science attachés or advisors in ministries of foreign affairs or embassies, and the development of a science-policy interface.

Engaging scientists, diplomats, and policy-makers in the development of science-informed policies through exchanges and joint construction of knowledge is crucial for addressing current and future challenges. This highlights the importance of a science-policy interface in supporting this process. I also found out that it is possible to use artificial intelligence to support diplomatic negotiation processes. Developing countries should use the opportunity to improve their regional and international negotiations on issues such as health, climate, peace, security, economy and energy.

As we can see, Science Diplomacy is a promising tool that developing countries should use to accelerate progress towards the SDGs. My ambition after this course is to integrate Science Diplomacy in the actions of the think tank I chair, namely the GRADES (Groupe de Recherche et d'Action en Diplomatie Et Santé), which works to use the mechanisms of diplomacy to achieve health goals. The course allows us to expand the scope of our think tank to Science Diplomacy, which remains little-known, in order to advance this practice in west Africa.

GRADES expects to become a future key player in Science Diplomacy. This will be done through the sensitization and mobilization of Science Diplomacy actors such as nations and their representatives (foreign ministries, embassies, diplomats, official representatives), other ministries or departments, international organizations, scientific academies, individual scientists, civil societies and the private sector around the practice of Science Diplomacy.

We need to do a knowledge transfer in Science Diplomacy through the strengthening of different actors' capacities in French-speaking countries. In addition, GRADES will position itself as a 'boundary spanning' organization in the science-policy interface in order to mediate between science and policy, to enhance communication and collaboration between researchers and policymakers in the science-policy interface.

Science Diplomacy represents an opportunity and a promising tool that can help nations in the achievement of SDGs. A huge effort is needed in most developing countries. Through this course in Science Diplomacy, GRADES will work to create the appropriate conditions for its implementation through the necessary institutional transformations and capacity building of human resources.

Traversing biomedical science, technology & innovation, policy, and diplomacy

Vid Nukala

Throughout my career, I have been drawn to international collaboration and cooperation in the scientific enterprise—what has recently been termed ‘Science Diplomacy’. This is perhaps due to my realisation that scientists predominantly work in international teams, whether they are within, across, or without borders. Yet, they can have a significant impact on what we know about the human body and mind, nature, and the universe, and how we see and shape the society around us.

Curiosity-driven open-sky research, or development towards specific goals, have given us the internet, vaccines, the international space station, but also the nuclear bomb. Most pressingly, the COVID-19 pandemic, conflicts over natural resources, climate change, and other UN sustainable development goals (SDGs) of Agenda 2030 continue to impact and are impacted by Science Diplomacy.

The purpose of Science Diplomacy is manifold. During times of peace, it could foster bilateral or multilateral accords and cooperation on mutually agreed interests on land, under water, or in space. It also keeps communication-channels across opposing sides open, or provides refuge to scientists escaping conflict. Science Diplomacy, when linked to SDGs, can increase the quality of life in developing countries through funding, technology transfer, or capacity building. When the ramifications of dual-use research are fully taken into account, it could help prevent human-made accidental or intentional catastrophes.

Over the past 15 years, working in academia, not-for-profit, philanthropy, and government (bilateral and regional) in Indian, U.S., and European ecosystems, I have been a ‘boundary spanner’ traversing biomedical science, technology & innovation, policy, and diplomacy (STI-Pol-Dip). Surrounded by biomedical STI and health diplomats, I interact with governmental and non-governmental actors, understanding how they influence each other, and work on the policies and processes to operationalize international cooperation.

In advancing global health within SDG 3, I have had the opportunity to work on emerging and converging biomedical and health technologies, air quality and health, traditional medicine and access to medical products, global health security, and women in STEMM, among others, that cut across the SDGs. Much of this work falls under ‘diplomacy for science’ and ‘science for diplomacy’, to enable access to, promotion of, and influence for STI.

Building on these experiences, I am now keen on engaging the lifesciences community across countries with varying levels of maturity in their research and policy ecosystems. It is not only important for researchers to understand the utility of policy and diplomacy, but also to actively contribute to the issues that impact their work and the world. I intend to draw upon the significant repository of knowledge and expertise within this community, while ensuring diversity and inclusivity in participation. Anticipation of STI informs and helps us prepare for optimal Pol-Dip responses.

Therefore, incorporating foresight studies, landscape reviews, as well as analyses of ethical, legal, and social issues of emerging and converging STI into ongoing and future policy work is essential.

A key component would be capacity building for those among the community expressing an interest in STI-Pol-Dip. With an emphasis on equitable participation, I would like to enable them by equipping them with knowledge and skills of a science policymaker/diplomat through training workshops and immersion visits. By facilitating connections with policy and diplomatic institutions and networks beyond borders, I hope to contribute towards building a cohesive, resourceful, reliable, and engaged lifesciences community. This would firmly establish it as a key actor in the multilateral STI-Pol-Dip arena.

Strengthening the linkage among STI-Pol-Dip is essential to address global challenges. At the same time, the directionality of STI-Pol-Dip discourse—disproportionately from the ‘Global North’ to the ‘Global South’—its disparities in resources available for scholarship, training, or practice of STI-Pol-Dip, metrics of measuring success, and understanding its limitations, all merit further investigation.

Boundary Spanning at the American Association for the Advancement of Science

B. Estefania Ortiz Calva

Diplo's course on Science Diplomacy allowed me to better conceptualize my role at the American Association for the Advancement of Science (AAAS), a 'boundary spanning' organization according to the Geneva Science-Policy Interface definition. AAAS is dedicated to building bridges between society and science, including strengthening the connection between policymakers and scientists. As part of the Center for Science Diplomacy (CSD) team, this course led me to ask: How can I be a more effective 'boundary spanner' between the diplomatic and scientific communities?

CSD focuses its Science Diplomacy activities around three pillars: by serving and fostering intellectual debate within the Science Diplomacy community of stakeholders, including via its journal *Science & Diplomacy*; by strengthening the capacities of scientists and diplomats who want to work on Science Diplomacy and fostering long-term collaboration between them; and by building relationships across disciplines, sectors, and borders, particularly where science can serve as a bridge when diplomatic relations are strained (Center for Science Diplomacy, n.d.).

The course made me reflect upon who the actors and/or venues for Science Diplomacy are. I consider AAAS –and the CSD in particular – to be both. It has served as a venue where key stakeholders have showcased projects related to Science Diplomacy, and as a community builder via the journal *Science & Diplomacy* and its AAAS-TWAS workshops. Yet, AAAS CSD has also played an active role as an actor of Science Diplomacy: it co-led the landmark AAAS-Royal Society (RS) framework on Science Diplomacy, and continues to expand the concept of Science Diplomacy through its editorials in *Science & Diplomacy*. Further, AAAS CSD has led engagement initiatives between scientific communities, such as U.S. and Cuban scientists, which are aimed at impacting relationships between actors where official relationships are strained (Fink, Leshner and Turekian, 2014; Madren, 2012).

Moving forward, I will continue to reflect on a broad definition of Science Diplomacy beyond the AAAS-RS framework as well as acknowledge the shortfalls and less than ideal implications of Science Diplomacy theory and practice. There is no simple or unique definition of Science Diplomacy (Turekian, 2018) and the AAAS-RS dimensions exist amongst multiple ways in which Science Diplomacy can be understood. Yet, this pioneering framework continues to be a point of reference when assessing what can be considered Science Diplomacy.

There are risks of oversimplifying and idolizing Science Diplomacy, particularly when confusing what Science Diplomacy should be with what it is able to achieve in practice. Also, I was grateful to familiarize myself with new concepts and literature on how to bring together scientists and diplomats without privileging any worldview and equally valuing what each one of them can bring to the table (Kaltofen and Acuto, 2018). These concepts and discussion of what is Science Diplomacy will be relevant for me when working on the content of CSD introductory workshops on Science Diplomacy.

Finally, I appreciate the emphasis during the course on the importance of anticipating crucial developments in scientific and technological innovations. Aware of the challenges and opportunities that innovations can bring, CSD published a special issue in *Science & Diplomacy* in February 2022 exploring the nexus between Science Diplomacy and emerging technologies.

Through our Ambassador Interview Series, we have seen how Ambassadors recognize the role that critical and emerging technologies play in foreign policy. As the Swiss Ambassador to the U.S., Jacques Pitteloud, pointed out in his interview, a new dimension of anticipatory Science Diplomacy may be needed to ensure everyone can benefit from scientific innovations while developing international frameworks that may be necessary to protect or regulate new technologies (*Science & Diplomacy*, 2021).

Science Diplomacy opportunities to address infectious disease

Lakmini Premadasa

In the field of infectious diseases research, Science Diplomacy is applied widely and plays a pivotal role globally on a macroscale, as well as in the day-to-day work of individual scientists. The COVID-19 pandemic has proven that infectious diseases have no geo-political borders and has been a wake-up call to scientists, policymakers and the public that Science Diplomacy should be utilized efficiently to fight global health crises. It was also a reminder that one nation or community cannot operate in isolation to tackle a highly contagious and deadly infectious disease, and that we are all only safe if we work together. This collaborative effort should include infectious disease researchers, healthcare professionals, government law makers, global organizations and more importantly, the general public, working together towards a common goal of achieving successful surveillance of disease spread, along with robust treatment and prevention mechanisms to mitigate disease.

In the case of the Ebola, Zika and COVID-19 outbreaks, Science Diplomacy was deployed to draw resources and experts from around the world to study the disease, help tackle the spread of the disease, and test and invent vaccines and treatment modalities. This global coordination is critical during pandemics. Although the measures that were taken were eventually significant to slow the spread of the disease, vaccinate people and lower the death toll, the COVID-19 pandemic has shown many signs of failure of coordination between science and diplomacy, and a lack of proper leadership at the global level to execute it. The slow transmission of information between science and governments caused failures in slowing the spread of the virus in its early stages. The ability to communicate effectively across various disciplines and stakeholders is a necessary tool for successful deployment of Science Diplomacy.

Policymakers often become aware of an issue and turn to scientists for solutions only after the problem emerges and is at a critical stage, rather than taking actions to prevent it by listening to scientific warnings. For example, when COVID-19 emerged, policymakers needed a solution quickly. Scientists have been warning of such outbreaks for decades but the lack of awareness of policymakers in scientific research, miscommunication and also in some cases deliberately ignoring warnings cost a lot of lives globally.

Therefore, in the future of Science Diplomacy, the successful involvement of knowledge brokers and 'boundary spanners' to fill these gaps will greatly improve global Science Diplomacy in the infectious disease field. Moreover, it is imperative that academic institutions prepare researchers not only for academic careers but also expose them to experiences that prepare them to work across the intersection of science and policymaking. As an academic scientist, I have experienced the lack of knowledge in the communication between science and policymaking. I believe that changing the academic curricula to address miscommunication and knowledge gaps between scientists and policymakers is critical. In my future career as an infectious disease scientist, I plan to conduct projects through which science can contribute to policy, and to collaborate with legislators and policymakers across disciplines to produce policy relevant science.

Science Diplomacy for Diplomats: the journey of a Cambodian diplomat

Sovanndanit Roath

The interrelation between science and international affairs has become increasingly apparent, especially after the COVID-19 pandemic which has brought about many unprecedented challenges to the world. This pandemic alone has made it evident that collective and cooperative global scientific efforts are of paramount importance when it comes to dealing with a non-traditional transnational issue, and yet it is just one amongst many issues. Others include climate change, lack of food and water security, biodiversity loss, achieving sustainable development, and the threat of nuclear weapons, all of which have scientific grounds and have become the center of international discussions on both bilateral and multilateral levels. As a diplomat, Science Diplomacy is hence relevant now more than ever.

I registered Diplo's online course with the above in mind. Throughout the course, I've learned that there are many ways science and diplomacy can cross paths but, in one categorization by the Royal Society, the connection between the two fields can be classified into the three types of activities, namely 'science in diplomacy', 'diplomacy for science', and 'science for diplomacy' (Royal Society, 2010, p. vi). First, 'science in diplomacy' can be demonstrated by the crucial role scientists play in informing foreign policymakers and diplomats with scientific advice.

With the ever-increasing science-related international dialogues, scientists have become important actors in addition to conventional actors like policymakers and diplomats who are assumably less well-versed in technical and scientific knowledge. Second, 'diplomacy for science' is indicated in the way diplomatic cooperation allows for the establishment of many scientific collaborations, which consequently boosts the exchange of experience, good practices, and the creation of pioneering projects, leading to more research findings and groundbreaking discoveries. Finally, an example of 'science for diplomacy' would be how scientists through 'track two' diplomacy can play an important role in boosting understanding, and easing conflicts, between countries.

With scientific innovation constantly advancing, Science Diplomacy will only become more integral in international relations in the future. In order to effectively maneuver Science Diplomacy, bringing all the relevant stakeholders together by establishing a network across the science, diplomacy, and policy nexus is crucial. For example, In Cambodia, the country I am from, the Ministry of Industry Science Technology and Innovation is responsible for science and technology-related subject matters, while the Ministry of Foreign Affairs bears the mandate to implement foreign policy.

Thus, cooperation between the two is indispensable in the practice of Science Diplomacy. Bridging two institutions with inherently distinct natures and fields of practice can be a challenge and a 'boundary spanner', someone who works at the interface, is critical in working as a bridge that connects two ministries. As a diplomat who recognises this fact, I wish to work to connect science and diplomacy, either through relying on scientific advice for more impactful and effective foreign policy or utilizing diplomacy to encourage and facilitate more scientific cooperation. Using what I

have learned on this course, I look forward to becoming an effective boundary-spanner who is able to foster exchanges, build trust, effective communication, and collaborations between scientists and diplomats.

With many pressing global issues remaining unsolved, Science Diplomacy is incredibly valuable and essential for the future of the world. As a diplomat, one should at least be able to grasp the concept and the practice of Science Diplomacy, even if not directly involved. The trend of diplomacy has changed, and traditional diplomacy, with only diplomats as its agents, is no longer sufficient. Diplomats and scientists need to work together to find innovative solutions for the protection and betterment of the world.

Open Science and Science Diplomacy

George Thomas

Scientific research has relied on a subscription based model for dissemination since the 17th century. Even after the digital revolution, this model (controlled by oligopoly giants) seems to continue to pose a barrier to sharing knowledge and the value of science as a common good. According to UNESCO, 70% of scientific publication was locked behind paywalls until the COVID-19 pandemic (Burke 2021).

Open Science (OS) is key for innovation, efficiency, and transparency, and it establishes lines of communication and social engagement. It further makes knowledge accessible to diverse groups outside academia (Besançon 2021). Communication and trust are essential for Science Diplomacy (SD), whereas paywalls do the opposite. My workspace defends the need for all science to be open, as a basic human right (GESDA 2021), and fosters SD.

COVID-19 clearly revealed the importance of OS to combat the virus and its aftereffects. Open circulation of knowledge was a key reason for the “fast forward” to COVID-19 pandemic recovery. We brought in various stakeholders including scientists, funders, and policymakers, and created an open platform to share content freely (Coronavirus Hub (2020)). According to Scopus (2020), Cardiovascular disease has been another pandemic in itself, affecting double the number of humans and resulting in four times the number of deaths (Ritchie and Roser 2019) as COVID-19. But only 26% of Cardiovascular research is freely accessible without paywalls or Open Access (OA).

OA is still neglected in the area of climate crisis and mitigation. According to Tai and Robinson (2018), an only 4% share of climate research was OA in 2007, which increased to 25% in 2018. Thanks to the pandemic, the importance of OA has resonated with international agencies (UNESCO 2020). Public participation and policy engagement is the need of the hour to face the climate crisis, and science communication needs to move to rocket speed, in the same way that mitigated the pandemic. Even though the oligopoly subscription market has not been opening its gates, agencies are making efforts to make climate research open (Creative Commons 2021).

My role involves amplifying the voices of these key stakeholders in the direction of OS (Policy Labs 2022), supporting consultations regarding national OA policies with evidence based research to drive policy decisions, like the UNESCO recommendation (Frontiers 2021), and working closely with young researchers in driving change, as they are the missing link in the Science and Policy puzzle (Morgan 2022).

These coordinated efforts have made the oligopoly subscription giants engage with OS, reluctantly, with complicated transformative agreements which enable double dipping of funds and extending paywalls to beyond 2024, the deadline set by Plan S (Widmark 2021).

The roots of the issue lie in the long-standing research assessment system which depends on metric-based evaluations that do not really indicate research quality. This is a result of

miscommunication wherein science and policy speak different languages, and there is thus a great need for mutual alignment. DORA, EUA, SPARC have expressed the need to change this set up with their call for action to policymakers/governments (Saenen 2021). Similar collaborative efforts through Science Diplomacy are being designed at the funding and government levels (Zubaşcu 2022).

My role as a 'boundary spanner' involves bridging the different stakeholders for OS to become the norm, and this indeed involves a clear focus on Science in Diplomacy. Busting OA myths and educating policymakers on the benefits and significance of OA is important. This surely involves a collaborative effort between the public, private and governmental sectors.

Science Diplomacy in Geneva and Switzerland

Samir Yeddes

The complexity of contemporary global challenges has increased the need and space for Science Diplomacy. Beyond being a fashionable concept in current multilateral diplomacy, the concept of Science Diplomacy represents a fundamental trend that could contribute to reshaping and reinforcing international cooperation. As an approach that enables the development and implementation of policies based on scientific evidence, Science Diplomacy could contribute to alleviating the consequences of present-day major challenges, from armed conflicts, climate change and loss of biodiversity, to inequalities and global health issues.

The establishment of a common vision and shared priority between states is increasingly challenging. Global governance is fragmented with interest groups and alliances. In addition, states have less and less of a monopoly on international relations: new actors, such as private companies or transnational political movements, have a growing influence. Against this backdrop, Science Diplomacy is about creating the appropriate conditions for policymakers to understand scientists' insights and for scientists to comprehend policy and political challenges. However, it not only concerns policymakers and scientists: a whole-of-society approach is needed for Science Diplomacy to be effective.

Switzerland, as a Host-State of international organizations, supports a number of platforms, which offer a neutral space for collective brainstorming and exchanges outside of formal settings, where stakeholders explore and test new ideas, share good practices, or discuss emerging issues. There are currently seventeen platforms of various sizes, covering issues ranging from human rights to the environment.

Each platform is community-driven and tailor-made to specific needs. Platforms bring together a diversity of stakeholders with an inclusive approach. They build communities, clusters of experts, and networks within Geneva, while bridging the gap with other centers of global governance and with the field. Geneva Platforms also act as knowledge hubs, providing training, conducting research and disseminating information. These activities contribute to achieving more trust between actors, building innovative partnerships, connecting knowledge, generating new thinking, and improving implementation of negotiated documents.

An excellent illustration of a Geneva Platform that contributes to building the field of Science Diplomacy is the Geneva Science-Policy Interface (GSPI), hosted by the University of Geneva. Backed by leading European research institutions. GSPI strives to enhance scientific engagement with global governance actors within the Geneva ecosystem, aiming to facilitate the emergence of effective policy and strategy solutions to complex problems.

I am convinced that Science Diplomacy is a fundamental trend that will stay with us for the coming decades, as we are witnessing a convergence of sciences that allows unimaginable scientific discoveries and technological breakthroughs. Current scientific revolutions will soon change the world. With the advent of digital technology, artificial intelligence, and robotics, human life is

changing and global governance systems will have to adjust accordingly. We need to connect scientists and policymakers on the one hand to solve current issues, and on the other hand to create mechanisms through which we can anticipate emerging issues to avoid any misuses of new technologies and to ensure that they are used for the common good of humankind. This is why the Swiss Government and the Canton of Geneva decided three years ago to launch the Geneva Science Diplomacy Anticipator (GESDA). The initiative was prompted by a growing awareness of the rapidly accelerating pace of scientific and technological breakthroughs. As a matter of fact, humanity is left with less and less time to adapt to new realities and create the legal frameworks and standards needed to regulate them.

A perspective from Jordan

Muna Zaqsaw

The topic Science Diplomacy has been a personal interest since 2016 when I first heard about the term and started researching it. My interest grew and I started to pursue more evidence-based learning. It was a great opportunity to have joined Diplo's Science Diplomacy course in October 2021. The course helped me learn about the tools and the progress of the topic, to help in applying it to the context of my career, my country's challenges, and future plans.

In the center of an unsettled region lies my country, Jordan. Neighbouring countries, in the political context, are in continuous conflict. Refugees are flowing into a country with very few natural resources, impacting its economy and therefore political stability. This scenario is one where Science Diplomacy can play a big role. The presence of Science Diplomacy in international negotiations, setting the size of donor funding in the example of my country, can most importantly contribute to navigating funding programmes properly using scientific evidence and opinion, and identifying potential consequences to mitigate the repercussions of an ever changing situation.

When I pursued my studies in physics, to fulfill the passion I have for science, little did I know then that my career journey would be around Science Diplomacy. Two years in a university laboratory, four years of 'boundary spanning' profession, followed by two years with an international research center, and finally my current position with a diplomatic organisation in Jordan, on a science and innovation fund. My last stop may sound like the last piece of the puzzle that completed my Science Diplomacy career, which will equip me with the skills needed to put science in a position of influence, affecting the decision making of governments for a better and safer world.

As the manager of the Newton-Khalidi Fund (NKF), a UK initiative funded by its Official Development Assistance (ODA), I lead on the bilateral relationship between scientific organisations in both countries. The fund runs activities with the aim to support the economic development of the host country. The economy of my country, Jordan, has been challenged for years now (Iffat, 2016). In the course of implementing NKF programmes, I stumble upon the world of Science Diplomacy quite frequently, where I learn how to be a diplomat keen to sustain a bilateral partnership, meeting the priorities of both countries and achieving co-ownership. My interest in developing these skills has to do with the aim of enhancing science policy practices in my own country.

Looking forward, I am planning to advertise the concept more within academic institutions in Jordan, to open new possibilities and demonstrate the responsibility a scientist holds upon her/his shoulders in international science collaboration. From a personal point of view, I find it easier and more logical for a scientist to learn the world of diplomacy, which already exists, acquiring the needed skills to bring science into the spot-light, rather than a diplomat doing it the other way around. The term Science Diplomacy is relatively new, however the practice can be traced back to the 1700s (Flink and Ruffin, 2019, p. 104). We will witness more academic curricula addressing the topic, more universities offering degrees of Science Diplomacy, and I want my country, too, to realise its importance.

About Diplo

Diplo is a Swiss-Maltese non-governmental organisation that specialises on capacity development in the field of Internet governance and digital policy. Established in 2002, Diplo, among other things, works to improve the role of small and developing states in global diplomacy by:

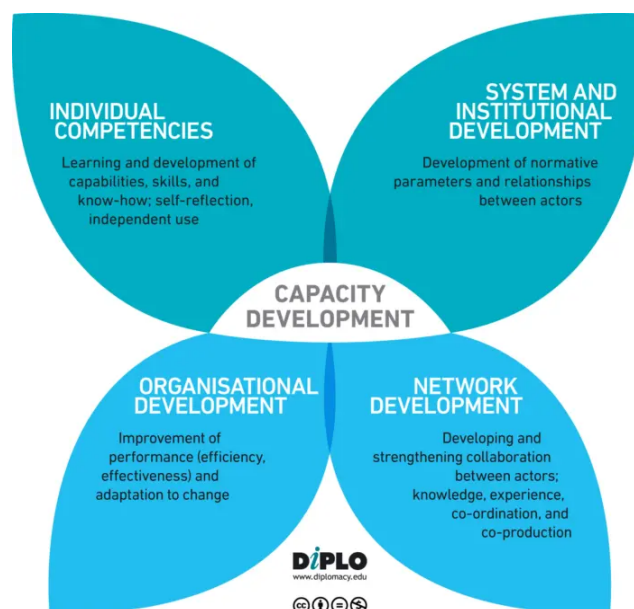
- training officials through online courses, workshops and simulation exercises;
- developing capacity on Internet governance, cybersecurity, data, artificial intelligence, other emerging tech issues, and science diplomacy;
- promoting and developing digital tools for inclusive and impactful governance and policy-making.

Over the years, Diplo has successfully trained over 6,600 alumni from 203 countries and territories, including individuals working in governments, the private and civil sector, media, and academia.

Diplo's Capacity Development

We believe that for capacity development efforts to be effective, they need to be anchored into the broader organisational, cultural, and policy contexts. For over 20 years, this holistic approach has been the cornerstone of Diplo's global work in capacity development.

We assist **states**, the **private sector**, **civil society**, and the **tech community** with **participating efficiently in global policy processes** and **shaping the overall evolution of digital governance and diplomacy**.



For us at Diplo, capacity development goes far beyond training. It needs to recognise the complexity of the processes it aims to influence, and the need for different types of knowledge – including

political, societal, and psychological. It needs to provide participants with practical and immersive opportunities to help them bridge the gap between theory and practice.

And it requires effective communication, reliable follow-ups, and support the emergence of vibrant and self-sufficient networks. Before delving further into our approach, we first need to be on the same page on what we mean by capacity and who needs capacity development why?

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