

Strengthening the Science-Policy-Society Interface: An Analytical Framework for Science Diplomacy in an Era of Accelerating Technological Change

Jan Lüdert, German Center for Research and Innovation New York, United States of America

Abstract

This paper examines science diplomacy (SD) in the era of rapid technological advancement, articulating its indispensable role in fostering international dialogue and cooperation for global policy formulation. It assesses the potential of SD to function as a pivotal bridge linking scientific innovation with worldwide collaborative efforts. The research reveals strategic approaches to bolster the interaction among science, policy, and societal sectors, focusing on initiatives that elevate public confidence in science, enhance research and development support, and cultivate progressive science and technology policies. Aiming to deepen the strategic comprehension of SD's role in generating sustainable, resilient, and innovative solutions amidst complex crises, it outlines actionable steps for scientists and policymakers, funding institutions, and others to mitigate the disconnect between knowledge production and its practical implementation at the science-policy-society nexus.

The last decade has seen an increased move to integrate scientific research and policy. From issues like vaccine development, space exploration, and climate resilience – scientific cooperation lies at the center of tackling the many challenges facing policymakers and global citizens today. The term “science diplomacy” (SD) is often used to describe a set of activities at the intersection of science, technology, and foreign diplomacy. In the shifting landscape of international relations and global policymaking, the role and concept of science diplomacy continues to develop and can encompass various approaches: diplomacy *for* science, science *for* diplomacy and science *in* diplomacy (Royal Society, 2010).

The Promise of Science Diplomacy: Solving Complex Issues Via Multiple Actor Input

Global policy formulation requires a complex taxonomy of units of analysis encompassing actors located at global, state, and non-state levels. This includes International Organizations, especially the UN system, governments, academia, and private and public sectors. As such, substantive and science grounded policy formulation confronts coordination problems across these units of analysis, including but not limited to access and participation asymmetries as well as translation and interpretation needs between actors and institutions.

Global issues related to the environment, human security and health, emergent technologies such as artificial intelligence and quantum computing, national security and international relations are complex, defy simple or static policy because they are rapidly evolving and inherently uncertain, messy as well as synergistic. Effective policies that aim to affect these issues therefore require sustained collaborations between

policymakers and scientists from various disciplines, working across states and at all levels of governance. These types of engagements rely on open institutions and a problem-solving culture based on conceptual coherence, shared values and practices amongst scientists, diplomats, legislators, and policy practitioners (Bednark et. al., 2016).

Moreover, provided that a variance between scientific research output and of science policy prevails, the knowledge-action gap between the science-policy-society interface continues to hamper the policy process as comparable to advances of academic outputs, or, to put differently, the expertise required to maintain and develop policy starkly differ. This, in turn, impacts societal change which, ideally, iteratively builds on evidence-based policy. On the side of higher education, a focus to adequately prepare the next generation of academics and policy makers with requisite expertise operating in science-policy spaces is lacking. This is evident as scientists’ know-how of the policy process has limited exposure to science diplomacy and capacity to deliver science advice. The science-policy-society interface, the author concurs, needs to therefore move beyond siloed understandings of what has been described as the “paradox of politicisation of science and the scientisation of politics” (Gore et al., 2020).

On this basis this policy brief outlines steps to strengthen the science-policy-society interface by shedding light on variances of the **supply side** (science and academia) and the **demand side** (policy makers and governance institutions) are used in these ecosystems that can be bridged and identifies practical means to better support science-policy-society collaborations for more effective, science-based policy making.).

Strengthening Information Flow Between Supply and Demand Side

On the supply side, in terms of knowledge production and scientific expertise, provided by researchers and scientists in higher education institutions and that are relevant in the policy process we suggest focusing on four concrete policy suggestions:

1. Integrate SD and Sustainable Development Goals (SDGs) into curriculum and research agendas (DWIH New York, 2023);
2. Expand opportunities for scientists to acquire skills relevant to policymaking (Lüdert, 2021);
3. Consider, starting at the moment of funding applications and throughout research cycles, the application of scientific findings for policy formulation;
4. Enhance science communication of scientific work and novel findings into societal discourse in order to raise awareness and establish trust in epistemic communities of praxis.

The above are necessary conditions on the supply side of the science-policy-society interface, and especially the integration of the SDGs is essential for preparing the next generation of leaders who can draw on science to improve policy. *By raising awareness, developing relevant skills, promoting interdisciplinary collaboration, encouraging research and innovation, and engaging in community outreach, we trust, a stronger science-policy interface is fostered.*

A key objective of integrating the SDGs into university research and curricula is to **raise awareness** of the global challenges facing humanity. This heightened awareness will offer researchers a vehicle and their students a unique opportunity to contribute to policy making for a more sustainable and equitable world. This entails recognizing that the world's challenges are interconnected and require interdisciplinary solutions. (UNU EHS, 2023) By incorporating the SDGs into the supply side of the science-policy nexus across various disciplines, researchers promote collaboration with policy makers. Such an **interdisciplinary approach** leads to innovative policy solutions and fosters a deeper understanding of the complexities of sustainable development. Higher education institutions, through their research and teaching, are central hubs and in an ideal position to contribute to policy grounded in the achievement of the SDGs. (United Nations - Academic Impact, n.d.) By integrating the SDGs into research agendas and supporting projects that address them,

universities generate innovative approaches, knowledge, and drive innovation across policy fields.

Incorporating the SDGs goes beyond research and education. Universities are also central places to establish partnerships with cities, local and regional organizations, government and ministries, and innovators and businesses to solve sustainability issues. These collaborations provide actors with skills and knowledge relevant for real-world scenarios furthering exchange of everyone involved as changemakers. In short, this policy brief calls for cross-sectoral engagement and critical understanding of sustainable development issues in research and curricula, enhance policy tools for future forecasting, global governance capacity, and strengthen public awareness of their active role in contributing to the achievement of the SDGs. Such an integrated approach will close the action-knowledge gap to draw on existing best practices, knowledge and capacities required to implement the 2030 Agenda for Sustainable Development and support concrete outcomes and lasting impact (United Nations, 2015).

On the demand side, to improve the basis of policy that is grounded in scientific findings and up to date evidence, policy makers require to establish:

1. Open access and participation channels to scientists and include a mandate that requires policy to be grounded in science and evidence-based findings;
2. Incorporate research and methods into the entire life cycle of the policy formulation process;
3. Establish means of active exchange of personnel between science and policy institutions, including in recruitment, retention, and overall team building.

In crafting effective policies, policymakers must navigate a complex landscape of societal needs, economic constraints, and environmental considerations. Essential to this process is ensuring that policies are rooted in scientific findings and up-to-date evidence. To achieve this, policymakers must focus on enhancing the demand side of policymaking, ensuring that scientific input is not only accessible but also integrated into every stage of policy formulation (Matsuda & Yoshimura, 2023). The above outlined three key strategies to improve the basis of policy through a scientific lens are:

Establishing **open access channels** to scientists is crucial for policymakers to gain insights from diverse scientific perspectives. By fostering transparency and

inclusivity, policymakers ensure that a wide array of scientific evidence informs their decisions. Open access platforms include public forums, advisory panels, and online databases where scientists can share their research and perspectives directly with policymakers (Björnsson & Lundmark, 2020). Additionally, policymakers should mandate that all policies be grounded in science and evidence-based findings, emphasizing the importance of rigorous research in guiding decision-making processes.

To integrate scientific findings into policy, it is essential to **incorporate research and methods into the entire life cycle** of policy formulation. This involves consulting scientific literature during the initial stages of policy development but, importantly, by continuously reassessing and updating policies based on new evidence. (Cairney et al., 2016) Policymakers, by working closely with scientists, can identify relevant research questions, conduct impact assessments, and monitor the effectiveness of implemented policies over time. By embedding scientific methodologies into policy formulation processes, policymakers ensure that policies are **adaptive** and **responsive** to evolving scientific understanding.

Facilitating an **active exchange** of personnel between science and policy institutions is vital for fostering mutual understanding and collaboration. Policymakers should prioritize recruitment, retention, and overall team building efforts that promote interdisciplinary dialogue and knowledge exchange. (Stilgoe & Wilsdon, 2016) This involves creating fellowship programs for scientists to work within government agencies or establishing joint research initiatives between academic institutions and policy think tanks. By bringing together individuals with diverse expertise, policymakers enrich their understanding of scientific issues and enhance the relevance and effectiveness of policies for society.

Conclusions

This policy brief explored the indispensable role of SD in global policy formulation amid rapid technological advancement, aiming to bridge scientific innovation with collaborative international efforts. Strategic approaches were identified to enhance interaction among science, policy, and society, focusing on initiatives to boost public confidence in science, support research and development, and shape progressive science and technology policies. By addressing coordination challenges, actionable steps were outlined to deepen the understanding of SD's role in generating sustainable, resilient, and innovative solutions. Global policy formulation involves a complex taxonomy of

actors spanning global, state, and non-state levels, including international organizations, governments, academia, and private sectors. Effective policies addressing complex global issues therefore require sustained collaboration between policymakers and scientists, necessitating interdisciplinary engagement and a problem-solving culture among scientists, diplomats, legislators, and policy practitioners.

This brief sought to offer a science diplomacy framework to strengthen the science-policy-society interface. The impetus here is simple: science is a central part of modern life and international relations. However, the authority of science, its epistemic communities situated in research institutions, industry, and governance institutions are no longer taken for granted and imbued with public trust. 'Systematic and unwarranted rejection of science—that is, *science scepticism*—has become a major societal problem' that poses a threat to the very fabric of liberal democracies and a value-based global order (Rutjens et al, 2021). In an environment where notions of objectivity, of free expression of science, of facts, and of evidence are being undermined, or in some instances ignored, the relevance of science diplomacy is not a trivial matter. On the contrary, scientific exchange require an open environment for critical, interdisciplinary and intersectoral engagement instead of being delimited by sceptics and a mistrust of evidence-based research (Lüdert, 2017).

Science diplomacy therefore must grapple with challenges imposed by non-scientific power political considerations. A "new" science diplomacy may contribute to civil society dialogue, to a sustainable development of society and economy, as well as to acknowledging national interests. Such an SD approach aligns goals differently "from region to region and weighs the opportunities and risks of international cooperation against each other. In an increasingly disorderly multipolar world, it contributes to the negotiation and implementation of multilateral partnerships" (DAAD, 2022).

To build trust in science and foster collaboration for developing actionable knowledge, a multi-actor approach is essential. Primarily, science communication helps bridge the knowledge-action gap. This involves not only disseminating scientific findings but also actively engaging with communities to address concerns and co-develop solutions. Second, policymakers are asked to prioritize open access channels to scientists, ensuring that diverse perspectives inform decision-making processes. By

mandating policies to be based in science and evidence-based findings, governments help reinforce the importance of rigorous research in shaping policies and in extension build public goods for societies. Third, facilitating exchanges between science and policy institutions through targeted programs and joint initiatives foster collaboration through co-design and co-production. By strengthening the science-policy-society interface in these ways, we can pave the way for more effective, inclusive, and sustainable policy solutions to tackle the challenges of the 21st century.

Despite the variance between scientific research output and policy, efforts to bridge the science-policy-society interface are hindered by limited exposure to science diplomacy and a lack of capacity to deliver science advice. To address this gap, steps were proposed to strengthen the science-policy-society interface by shedding light on variances between supply-side (science and academia) and demand-side (policy makers and governance institutions) ecosystems, fostering cross-sectoral engagement, and enhancing science-policy-society collaborations for more effective, science-based policy making. This integrative approach, the author trusts, bridges the action-knowledge gap, facilitating the achievement of the 2030 Agenda for Sustainable Development.

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