Bridging STI Policy and Foreign Policy: Advancing Action-Oriented Science Diplomacy

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Introduction

Science diplomacy is entering a new phase. For several decades following the end of the Cold War, international scientific cooperation expanded within an increasingly globalised environment. Scientific exchange, collaborative research programs, and transnational networks flourished. Science diplomacy was widely understood as an instrument of soft power that strengthened mutual trust and facilitated international cooperation.

Today, however, the environment in which science operates is undergoing a structural transformation. Geopolitical tensions are intensifying, while emerging technologies—particularly artificial intelligence and quantum technologies—are advancing at unprecedented speed. At the same time, a small number of large technology companies now exert significant influence over diplomacy.

These developments are reshaping the relationship between science, technology, and international politics. As a result, science diplomacy must also evolve. Understanding this transformation requires attention to the historical evolution of national science, technology, and innovation (STI) policy.

From Globalisation to Geopolitical Fragmentation

Since the Second World War, the objectives of STI policy have evolved in response to societal demands, geopolitical contexts, and technological opportunities. During the Cold War, science policy was closely linked to national security and strategic competition. In the decades that followed, globalisation and market-driven economic growth became dominant forces, shaping innovation policies in many countries. International competitiveness and economic growth became central policy goals. Within this context, science diplomacy emphasised international research collaboration, open scientific exchange, and the expansion of global scientific networks. Scientific cooperation was widely regarded as a means of strengthening soft power and building trust among nations.

Today, this paradigm is changing. STI policy has evolved from a sectoral policy to the center of national strategy. Governments increasingly view technological capabilities as critical assets for economic, national, and geopolitical security. Supply chains for semiconductors, advanced materials, and digital infrastructures have become strategic concerns, while export controls, technology protection measures, and international standard-setting have become important elements of diplomatic practice.

At the same time, the rapid rise of large technology companies has introduced new actors into global technology governance. Their control over data infrastructures, digital platforms, and technological

ecosystems increasingly shapes innovation trajectories, market structures, and regulatory debates across borders.

This shift does not mean that international scientific collaboration has lost its importance. On the contrary, many global challenges—such as climate change, pandemic preparedness, energy transitions, and biodiversity loss—require deeper international scientific cooperation. The challenge, therefore, is not to choose between openness and protection, but to manage both simultaneously. Science diplomacy now operates at the intersection of cooperation and strategic competition.

Linking STI Policy, Science Advice and Science Diplomacy

In this evolving landscape, it is useful to view science diplomacy within a broader governance framework linking STI policy, science advice, and science diplomacy. STI policy provides the strategic direction that shapes national research priorities, technological capabilities, and innovation systems. Science advice translates scientific knowledge and technological assessment into evidence-informed policy choices. Science diplomacy then operates externally, connecting these national capabilities and policy objectives with international cooperation, negotiation, and governance. In this framework, science advice functions as a critical bridge between domestic STI policy and international science diplomacy, enabling governments to align scientific expertise, national strategy, and global engagement.

Today, policy decisions related to emerging technologies are often made under conditions of high uncertainty, incomplete evidence, and rapidly evolving technological trajectories. Science advice must therefore become more anticipatory and strategic. Governments increasingly require analytical and design capacities that combine scientific expertise, strategic foresight, and risk analysis. Strategic intelligence in STI policy has thus become essential for modern governance.

Science advisers must operate across a broader range of policy domains. Emerging technologies intersect with new industrial policy, national security policy, regulatory governance, and international diplomacy. In this complex landscape, science advisers help policymakers navigate interactions among technological development, societal impacts, and geopolitical dynamics, while maintaining scientific integrity and independence.

These evolving responsibilities require new competencies, education, and training for the next generation of science advisers and science diplomatic practitioners.

National Institutional Actions: The Case of Japan

Countries are experimenting with different institutional approaches to strengthen science advice and science diplomacy, depending on their distinct political systems and cultural contexts.

Japan provides an illustrative example. As in many countries, science diplomacy is primarily promoted through the Ministry of Foreign Affairs and its diplomatic service. However, two additional institutional mechanisms have emerged as increasingly important.

First, Japan has increasingly utilised research funding programs as instruments of international engagement. Funding mechanisms that support international research collaboration and talent mobility are designed not only to advance scientific knowledge but also to strengthen diplomatic relationships and regional trustworthy networks. STI policy and research funding systems can therefore function as practical tools of science diplomacy.

Second, Japan has taken steps to strengthen the institutionalisation of scientific advice within policy processes. Embedding scientific expertise in strategic policy discussions allows governments to incorporate evidence-based analysis into foreign policy and technology governance.

These developments highlight a broader lesson. Effective science diplomacy depends on robust national science advisory ecosystems.

Operationalising Science Diplomacy through STI Policy Instruments

A persistent challenge is that science diplomacy is often discussed as a concept, while the policy instruments that could operationalise it remain underutilised. In many countries, STI policy and foreign policy still operate in parallel rather than in close integration. Research funding programs, innovation partnerships, and science advisory mechanisms could serve as practical tools of diplomacy, yet their strategic use remains limited. Bridging this gap—linking STI policy instruments with diplomatic objectives—will be essential for transforming science diplomacy from a normative idea into an action-oriented practice.

Strengthening Global Science Diplomacy Infrastructure

At the international level, several organisations play complementary roles in supporting science advice and science diplomacy. International institutions such as the International Science Council (ISC), the International Network for Governmental Science Advice (INGSA), the Foreign Ministries Science and Technology Advice Network (FMSTAN), and scientific assessment bodies such as the Intergovernmental Panel on Climate Change (IPCC) contribute to the global architecture of scientific cooperation and policy advice.

In an increasingly fragmented geopolitical environment, these institutions can function as important global public goods by providing stable platforms for dialogue, knowledge exchange, and trust-building among scientists, policymakers, and diplomats.

Science diplomacy also involves a broad spectrum of actors. In the rapidly changing world, the traditional distinction between Track 1 and Track 2 diplomacy only partially captures this complexity. In practice, science diplomacy operates across a continuum that involves governments, scientific institutions, international organisations, the private sector, and civil society.

Conclusion

The global system is entering a period of profound transformation. Rapid technological change and growing geopolitical fragmentation are reshaping the environment in which science operates. In this context, science diplomacy can play an important stabilising role. It can help sustain international cooperation in addressing global challenges while contributing to the governance of emerging technologies. However, science diplomacy will not be effective if it remains primarily a conceptual framework. It must be grounded in practical policy instruments. Integrating STI policy with foreign policy—through research funding programs, innovation partnerships, and science advisory mechanisms—offers a pathway for translating scientific cooperation into strategic diplomatic practice. Science diplomacy is therefore becoming not merely a supplementary activity, but a core capability for managing geopolitical uncertainty and governing technological change in the 21st century.

Resources

1. Centre for Science Diplomacy (2025) Science Diplomacy in an Era of Disruption - A 2025 Report by the Royal Society and AAAS. https://www.aaas.org/news/science-diplomacy-era-disruption
2. Directorate-General for Research and Innovation (2025) A European Framework for Science Diplomacy. https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/european-framework-science-diplomacy-2025-02-13_en
3. Turekian VC, Gluckman P (2025) Rewiring science diplomacy. *Science*, 389 (6762): 761. https://www.science.org/doi/10.1126/science.aeb4815
4. Asano K (2026) Science Diplomacy in Japan: From Policy Frameworks to Strategic Action. *Science & Diplomacy*. https://doi.org/10.1126/scidip.aeg8770
5. Turekian VC, Gluckman P, Kishi T, Grimes R (2018) Science Diplomacy: A Pragmatic Perspective from the Inside. *Science & Diplomacy*. https://www.sciencediplomacy.org/article/2018/science-diplomacy-pragmatic-perspective-inside