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Reinvigorating Science Diplomacy in a New Era of Geopolitical Tension

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Little in recent memory has offered as stark a reminder of why continued investment in science and technology is crucial as the rapid roll-out of mRNA vaccines. This timely response, enabled by research funded and conducted over decades via collaborative international efforts, acts as a testament to the foresight of past policymakers and their understanding that international science and technology cooperation is paramount to US interests.[1] Moreover, as argued at the roundtable gathering of the 2021 National Academies of Sciences, Engineering, and Medicine by James LeDuc—former director of the Galveston National Laboratory, one of the largest active biocontainment facilities on a US campus—essential scientific dialogue has gone forward despite geopolitical tensions over the past years.[2] Thus, it is pivotal to underline—to Congress and the wider public—the power of scientific collaboration to limit risks for everyone. "In a world being transformed by technology," as former secretary of state Madeleine Albright stated in her May 2000 memorandum, "good science is vital to good diplomacy."[3]

Since World War II, as its economic and geopolitical clout grew, the United States has largely developed science diplomacy as a standard tool for international relations.[4] By 1960, America accounted for 70 percent of global spending on research and development (R&D).[5] By 2019, the US share dropped to 27 percent while China's rose to 22 percent. China is now on track to overtake the United States in total R&D spending by 2030, while the US science & technology (S&T) investment is less than half of its high-water mark.[6] In 1964, at the peak of the space race, the S&T federal budget made up 1.9 percent of GDP, while today—though technology is the fuel—it is just 0.7 percent.[7] For the United States to maintain its position as a global S&T leader, the Science & Technology Action Committee (a group of nonprofit, academic, foundation, and corporate leaders) concluded that funding must be at least doubled over the next five years.[8]

Although the 2022 CHIPS and Science Act offered hope to supercharge US R&D leadership, Congress is already significantly falling short of CHIPS' ambitious funding target by more than $10 billion for the next two fiscal years.[9] Concurrently, the world has entered a new geopolitical chapter: the reemergence of multipolarity and geostrategic competition.[10] These developments suggest that S&T leadership through science diplomacy is now more vital than ever. The United States must partner internationally to maintain its scientific and technological edge.

Yet, the US government is imposing new restrictions on international scientific collaboration and considering limiting the topics of collaboration due to perceived national security concerns.[11] Despite global political tension impacting scientific partnerships, the value of science diplomacy remains unchanged: building a common and apolitical language which unites allies and adversaries through innovation to address global cross-border challenges.

For the United States to remain the global S&T leader, its approach to science diplomacy has to be actively designed and its research and innovation environment strengthened. In pursuing a template of "managed strategic competition," America should prioritize working through multilateral forums and motivating private sector R&D and STEM (science, technology, engineering, and math) talent retention.[12] The time to invest in America's future is now.

Analysis

Currently, the United States is missing out on immediate and long-term strategic opportunities for international science engagement and is losing ground on R&D expenditure to the People's Republic of China (PRC). The current PRC five-year S&T plan aims to attain a global leadership position across science, education, and talent attraction by 2035.[13] Per the 2022 Intelligence Community's National Threat Assessment, access to the latest know-how in S&T has become a critical part of the PRC's priorities in establishing formal international relationships to achieve its ambitions.[14]

The US government, in contrast, tends to have a near-future focus, with limited long-term commitments to international science partnerships. Funding mechanisms specific to facilitating bilateral or multilateral partnerships or international resource sharing are thus not readily available. Moreover, "lead agency" opportunities are limited in enhancing cooperation with emerging economies, offering simplified strategic collaboration options that tend to function only if each government has substantially similar capacities.[15]

The PRC, owing to its financial and long-term strategic planning leverage and near-peer competitor status, can direct funds for scientific cooperation to countries without US presence as loans and via other instruments for high-tech and space programs.[16] It has also established partnerships with institutions from high-income countries through joint funds. These programs, despite their still modest funding, can have a significant soft power impact, especially when America cannot offer similar initiatives.[17] Amid rising geopolitical tensions, science cooperation's potentially significant soft power impact on improving informal multilateral relationships is even more decisive.[18]

In failing to improve its existing—often short and intermittent—research partnership investments, America leaves little room to establish the needed capacity and meaningful partnerships with countries across all levels of economic development. US interests might therefore be harmed in multilateral and standard-setting bodies. To increase US influence in S&T areas internationally, the ability to program over longer periods is critical.

Also key for the future of science diplomacy are science and technology agreements (STAs). Research agencies can use them to accelerate collaborative activities, although they may raise unrealistic funding or bilateral engagement expectations without offering effective benefits to the United States.

The debate on the extension of the forty-four-year-old US–China STA in August 2023 revealed that STAs remain one of America's best tools to signal to partner governments its intention to continue the negotiation of implementation arrangements or cooperation instruments.[19] STAs can offer crucial, regular opportunities to convene and discuss. Extending the US–China STA, despite reservations by the House Select Committee on China, highlights that being in dialogue with one's opponent is essential.[20] However, as the debate elucidated, these types of agreements cannot directly provide enhanced and reciprocal access to resources for the US private sector and academic interests in the countries with which the United States has an STA. More effective structuring mechanisms are needed.

Lastly, for future science leadership and to improve the US approach to international S&T engagement, talent retention will be fundamental. To attract the world's top scientific talent, the United States, representing less than 5 percent of the global population, must remain the destination of choice for the world's brightest.[21] However, the regulatory process surrounding student visa applications dampens foreign students' desire to study here.[22] Though the Biden administration promised in 2022 to alleviate some of these administrative burdens and extend the time of optional practical training (OPT) for STEM students, the science fields covered for the new OPT rule in the recently announced Federal Register note only cover a fraction of ninety-seven overall suggested fields. Meanwhile, China, the United Kingdom, and Canada are aggressively courting international students and researchers. The PRC, according to a 2022 report by Georgetown University's Center for Security and Emerging Technology, is already outpacing the United States in the number of graduating STEM PhDs and is set to produce twice as many STEM PhDs as the US by 2025.[23]

Recommendations

To improve the US approach to international S&T policy and cooperation, more flexible and longer-term approaches to funding international collaborative science should be considered. Structuring financial frameworks that enable longer-term research funding and scientific initiatives can more effectively pool resources and synergies for scientific discoveries. Foreign governments greatly support multinational research consortiums, spending billions of dollars on participation, but the United States has no similar science diplomacy initiatives. For example, Horizon Europe, the flagship funding program of the European Union (EU), has a $105 billion budget under its seven-year multi-annual financial framework (2021–27).[24] It is designed to support international collaboration, with funding available to all EU member states and a group of associated countries within and outside Europe. Its size and scope offer global S&T research opportunities, and it has prompted those countries to leverage their own resources to support the program. Currently, eighteen non-EU countries are either contributing their own funds for scientists or are under a transitional arrangement that allows their scientists to participate in the program.[25] The EU's ability to support international research consortiums and leverage funding from other countries to do so has considerably increased its presence and influence in international S&T policies and programs.

The United States should consider creating a flexible mechanism within the Department of State to support joint S&T goals with foreign partners. Projects and initiatives could include consortiums support that are of strategic, scientific, national security, and foreign policy interests to America. This mechanism would complement funding from science agencies and encourage decisions based on substantial interagency-appropriated funds for international use to enable more collective action, thus creating a framework with clear economically quantifiable R&D benefits to the country.

Creating STAs with additional legal authorities for enhanced access to the resources of close allies and partners could help revive scientific collaborations where trust in STAs without direct reciprocal access stipulations has been compromised. Notably, STAs remained in place even between the United States and the Soviet Union at the height of the Cold War and had a powerful impact on enhancing security interests.[26] Projects like the Apollo-Soyuz Test during the Cold War, among others, proved that cooperation is an effective means to building bridges.[27] Similarly, the current US-China STA extension may act as an opportunity to negotiate further modifications, including provisions for shared security or ethical review. Though geopolitical tensions rose since, electing to not continue STAs may signal a changed assumption about the other and impel increased confrontation.

Expanded data access, scientific exchange, and greater visa flexibility for both the private sector and academia in connection with STAs, extending beyond direct bilateral initiatives, would create a broader S&T ecosystem with allies and emerging science partners. Making STAs relevant beyond a limited bilateral initiative can motivate wider international scientific partnerships and enable a more robust foundation for building long-term and interconnected relationships. An S&T agreement might be a limited, one-time deliverable or a launching pad for meaningful international value and knowledge exchanges. Continued relevance of the agreements can be ensured by building STA mandate longevity and flexibility with benefits for both parties beyond a one-off initiative, enforced by legally and financially binding commitments. Beyond enforcement mechanisms, crafting a comprehensive framework to track an STA's ecosystem benefits secures its future relevance.

Finally, the United States should adopt bolder measures to retain talent and actively incentivize scientific talent to contribute to science diplomacy. Despite the US making improvements—such as offering a three-year optional training program after graduation for F-1 and J-1 students in a subset of STEM-related fields—other countries offer greater opportunities to foreign STEM talent.[28] Germany allows international students to live in the country for up to eighteen months after graduation to find a job and offers them permanent residency after two years of post-graduation employment.[29] The US administration should alleviate the F-1 and J-1 application burdens and extend the new OPT permissions to a wider set of STEM fields beyond the twenty-two covered in the newly granted OPT extensions. It should also further review the opportunities to secure those qualifying for extended STEM OPT for international collaboration initiatives within federal science agencies and

prepare them for diplomacy roles. Providing incentive frameworks and recruitment opportunities to international talent contributing to international standard-setting bodies and relevant international working groups focused on science diplomacy could help close America's international S&T cooperation gap.

Conclusion

If the United States narrows its collaboration efforts, other countries will not, which may genuinely threaten future global science access for America. As international skepticism surrounding US foreign policy intensifies, civil society—especially scientists and engineers— can play a critical, constructive role in reinforcing US foreign policy priorities. America can strengthen its foreign relationships through science, and it can enhance national security and economic interests by partnering with other countries to build technological capacities and work with international partners to tackle global challenges.

Science diplomacy can help in building common ground. It can facilitate the peaceful management of international spaces and produce technological breakthroughs of global relevance. Especially during global tensions, for science to continue to maintain essential channels of communication is paramount. To get US international strategies right, one must—in Madeleine Albright's spirit—get science right.[30]

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