12 JUNE 2025 14.00 - 17.00

Panel 50. STS and the History of Technoscience Diplomacy

Convenor:

Roberto Lalli, Politecnico di Torino

Keywords: history of science and technology, international cooperation, science diplomacy, soft-power

Over the past two decades, "science diplomacy" has emerged as a prominent focus for policymakers, scientists, and analysts. Advocates of science diplomacy within national and international policy circles highlight technoscientific cooperation and exchange as beneficial for fostering international relations and addressing global challenges. However, critical analysts argue that the science diplomacy discourse rests on assumptions that STS scholars have long questioned, particularly the idea that science is inherently benign and that scientists operate exclusively with "good" intentions. Much of the science diplomacy literature further presumes, often uncritically, that scientific collaboration inherently enhances relations between nations. Critics contend that science diplomacy is a buzzword, covering a spectrum of practices and initiatives driven by diverse objectives, while overlooking the nuanced distinctions between various types of science and technology involved. These critical perspectives suggest a need for a more precise understanding of science diplomacy's heterogeneous practices. Key challenges include avoiding simplistic generalizations while retaining the ability to make meaningful comparisons and generalizations and ensuring that these insights are not framed with an overly optimistic, conciliatory view of international cooperation in technoscience.Historians of science and technology have contributed to this debate, frequently aligning with STS-informed critical perspectives. Using historical case studies, they illustrate how different technoscience diplomacy efforts have served distinct—and sometimes contradictory—aims, often to maintain political or technological dominance. While historical scholarship on science diplomacy is expanding, there remains a limited focus on methodological approaches that integrate historical analysis with STS frameworks.This panel addresses these methodological concerns by inviting scholars to present historical cases of technoscience diplomacy, emphasizing the STS concepts and methodologies - both explicit and implicit - that inform their research. Topics may include, but are not limited to:

- the co-production of technoscience and diplomacy across historical contexts;
- longitudinal network analyses of international technoscientific cooperation through an STS lens;
- boundary objects and boundary work within science diplomacy;
- feminist approaches to the history of science diplomacy;
- distinctions between science and technology in the science diplomacy framework;
- dual-use dilemmas within science diplomacy;
- translation and brokerage roles in historical cases of science diplomacy;
- socio-technical imaginaries shaping science diplomacy strategies;
- the influence of national cultures on science diplomacy practices;
- science diplomacy as a form of soft power, analyzed through STS perspectives

The panel will conclude with a focused discussion on methodological issues, fostering stronger ties between historical and STS approaches to enhance the relevance of historical analyses for current evaluations. This panel is sponsored by the Italian Society for the History of Science (SISS).

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ID 139 - Just or fast: The public–private shift in nuclear fusion research as a clash of sociotechnical imaginaries

Alessio Giacometti, Università degli Studi di Padova

Keywords: nuclear fusion, sociotechnical imaginaries, science diplomacy, science privatisation, market fundamentalism

Nowadays nuclear fusion – an elusive source of potentially clean and abundant energy that scientists have been chasing for decades – is said to having reached an epochal turning point: once the preserve of publicly funded universities, national labs, and intergovernmental projects, research in fusion is being more and more populated by private companies, most of which are US-based and financed. The perceived change in fusion leadership is strikingly sharp: up to few years ago, the attention of the fusion community was catalysed by ITER, a huge experimental reactor slowly under construction in southern France by initiative of 35 Countries to prove the scientific and technological feasibility of fusion once and for all, while in recent times the hegemony of ITER in the fusion landscape has been challenged by a growing proliferation of private start-ups that are entering the field and claiming they can build their own fusion reactors, as alternatives to ITER's, and with a faster, cheaper and smaller scale approach.

Such a "paradigm shift" in fusion research begs the question to the outsider: why is fusion rapidly going private? Or put differently: how can we account for these two opposite pushes, one to politicise, internationalise and turn fusion research into mega-science with ITER, and the other to de-politicise, de-internationalise and turn it into a business for private enterprises?

Answers to these research questions put forward so far appear to be unsatisfactory: the public-private shift in fusion research gets often rationalised to make it perceived as normal, necessary, inevitable, even providential. And yet the two lines of research – ITER versus the start-ups considered as a whole – are entangled in a scientific controversy about the proper size, shape, cost, timescale, and innovation strategy for building a proof-of-principle reactor with a net gain, successfully and as soon as possible. A qualitative analysis of the public discourses on the changing political economy of fusion research will be presented and the theory of sociotechnical imaginaries will be used to understand the conflicting visions behind the two approaches. It is shown that ITER embodies in fact a "just fusion" imaginary leveraging on science diplomacy to develop fusion as a common good and protect it from the anarchy of market and international competition, while the private fusion movement reflects a "fast fusion" imaginary subordinating energy justice to market efficiency and science diplomacy to the development of fusion in a timescale relevant for the climate crisis. Clearly, both imaginaries have their merits and their limitations too, which will be analysed from an STS perspective to show their implications for the social acceptability of fusion, energy justice, climate diplomacy, and science privatisation.

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ID 277 - Uniting Europe for/from fusion energy: Technoscientific networks and the political integration process

Roberto Lalli, Politecnico di Torino

Keywords: technoscience diplomacy, history of science and technology, fusion energy, European integration

A central question in historical studies at the intersection between technoscience and international relations is the mutual impact of cooperative European technoscientific projects and the political process of European integration. Alongside studies of major scientific endeavours, such as CERN, ESA and EMBO, international cooperation on fusion research has been posited to play a significant historical role during key moments of European integration. Within the framework of the PRIN PNRR 2022 project FusEurope: European Cooperation in Nuclear Fusion Research – From History to Future Policy Design, this talk examines

how European technoscientific cooperation in nuclear fusion research evolved from the 1950s to the early 2000s, set against the global development of the field. Applying concepts and tools from network science, the study investigates changes in international cooperation patterns over time. A quantitative analysis of more than 45,000 publications indexed in the Web of Science, complemented by data on participation in international commissions and projects, reveals a significant increase in collaboration after 1958, following the declassification of fusion research. This growth further accelerated in the late 1980s, aligning with broader trends in global scientific collaboration during the post-Cold War era.

Using co-authorship as a proxy for international cooperation, the study identifies a marked increase in collaborative research among EEC/EU countries, accompanied by an increasing centrality of these countries in the global fusion research network. By comparing longitudinal co-authorship networks with the interlocking directorate of international commissions, the analysis highlights how decision-making processes were linked to tangible research collaborations. It shows that the establishment of the European Union significantly reshaped cooperation schemes among European countries, transitioning from institutional agreements to deeper integration in research activities.

This study contributes to the interrelations between STS and the historical analysis of science diplomacy in two ways. First, it discusses the application of social network analysis to the study of techno-scientific-political networks, comparing it with approaches such as Actor-Network Theory. Second, it examines how socio-technical imaginaries of clean energy production of future nuclear fusion plants, shaped the historical development of international cooperation in fusion research.

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ID 287 - Scientific sharing and diplomatic contacts in influenza surveillance during the Cold War and decolonisation

Giacomo Simoncelli, Università di Roma La Sapienza

Keywords: influenza, surveillance, virology, vaccines

Influenza surveillance, organised by the WHO in 1947, had immediately to deal with the difficulty of promoting the fight against a borderless disease within a framework of international divisions and conflicts. Surveillance as envisioned by the British virologist C. H. Andrewes was characterised by the exchange of information and scholars, but also by the sharing of strains and the centralisation of research activities at the World Influenza Centre in London. Most of the laboratories that could meet the needs of the WHO were located in Europe and North America. Therefore, when the Eastern Bloc decided to withdraw from the Geneva institution between 1949 and 1950, the functioning of surveillance already seemed to be questioned. And yet, the severing of official ties with the WHO did not mean the end of relations between virologists of the two blocs. On the contrary, the fight against influenza would become a field of dialogue in the following decades, despite the various tensions. The production of a 'homologous' vaccine, created from the specific strain whose spread was to be stemmed, required that samples were made available in a timely manner. However, immunisation was also linked to different techniques, technologies and vaccine types.

This paper will focus on the development of the virological research framework on these issues at international level, which will be examined in conjunction with the historiographical investigation of its relationship to the events of the Cold War and decolonisation, from the late 1940s to the early 1980s. In particular, with regard to the sharing of strains and antigenic analyses of them, the informal relationship maintained between the World Influenza Centre and the Eastern Bloc countries during the first half of the 1950s, when they were inactive within the WHO, will be retraced in its main stages. With regard to techniques and technologies developed through international research projects, the paper will examine the link maintained by London with apartheid-sanctioned South Africa, involved in studies on methods for the rapid identification of virus antibodies.

The British laboratory became a sort of clearing house that allowed the exchange of information and expertise, despite the fact that South Africa officially had no relationship with Geneva. Furthermore, I will

examine the leap in the collaboration between the United Kingdom and the Soviet Union on live influenza vaccines in the early 1970s. Explicit diplomatic interests, due to Nixon's attempt to ease relations, will be emphasised. The greater cooperation between London and Moscow found a suitable ground to develop in the already established relationship between British and Soviet virologists through a WHO trial on live influenza vaccines.

This study aims to demonstrate that influenza surveillance was never undermined by the intricate geopolitical dynamics of the post-World War II era. And at the same time, it became a diplomatic tool and, sometimes, a vector of competition between states over their role in the international health arena. The sources used for this paper are from the WHO archives, from the World Influenza Centre's documentation held by the Wellcome Library, and also from the UK Foreign Office's funds, reviewed at The National Archives.

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ID 335 - The Diplomacy of Standardisation: Negotiating International Electrical Units from the 1930s to the 1960s

Sara Bassanelli, Università di Pavia

Keywords: technoscientific standardisation, electrical units, international techno scientific cooperation, physics, science diplomacy, STS

Techno-scientific standardisation emerged as a key endeavor of international scientific organisations during the interwar period, laying the groundwork for subsequent global agreements. However, the diplomatic dimensions of negotiations on international standards – and their influence on Cold War standardisation practices – remain underexplored. This talk examines these dynamics through the case of international debates over defining electrical units, using an STS-inspired network analysis to examine how scientific, technological, and geopolitical factors intersected in international technoscientific cooperation. Beginning with the interwar period, the presentation analyzes interactions between individuals, national laboratories, and international bodies such as the International Union of Pure and Applied Physics (IUPAP), the International Bureau of Weights and Measures (BIPM), and the International Electrotechnical Commission (IEC). These negotiations balanced competing priorities – economic, scientific, and technical-industrial – while operating within a geopolitically charged context. The analysis then shifts to the post-World War II era, examining how transformations in the global institutional and political landscape culminated in the adoption of the International System of Units (SI) in 1960. By tracing continuities between interwar and postwar practices, the talk highlights how Cold War scientific agreements were shaped by earlier exchanges of data, resources, and authority, challenging the notion of scientific collaboration as inherently neutral or universally beneficial.

Reconstructing this history demonstrates how integrating historical analysis with STS frameworks deepens our understanding of the diplomatic dimensions of technoscientific work. Using STS concepts such as co-production and boundary work, this study makes three key contributions. First, it shows how technoscientific debates both shaped and were shaped by geopolitical dynamics. Second, it examines the multi-faceted process of constructing structures and networks for standardizing electrical units, emphasizing the interplay of scientific expertise, institutional decision-making, and state priorities. Finally, it argues that standardisation served as a tool for dominant nations to assert authority, embedding their influence within international relations.

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ID 377 - Eroding Histories: Soil Science, Governance, and the Making of Degradation in Turkey

Almina Akbalcik, Goethe-Universität Frankfurt am Main

Keywords: soil degradation, soil science, history of science, science governance, science diplomacy

This research asks, "How did soil science develop in Turkey, and how does its evolution intersect with soil degradation?" It traces the historical and sociotechnical processes through which soil science and soil degradation were co-constructed in Turkey.

Described as a "silent global crisis" (HBS, 2024), soil degradation has recently become a concern, reflected in environmental policies. According to policy advisory and scientific reports, most European soils are degraded, and the soils of Anatolia are no exception. Yet, from a larger time frame, today's ecological challenges tied to soil degradation represent only the latest chapter in humanity's dependence on soil. In Anatolia, soil degradation has been a phenomenon that has been present since ancient times, as a force that molded its landscapes in the form of erosion, and (re)shaping agricultural practices in the form of nutrient loss. During the Republican era, this persistent phenomenon was reassembled as an environmental problem shaped by the dynamic interplay of scientific techniques, governance strategies, international relations, and national cultures (Stengers, 2010).

The research attends to this process of reassembling soil degradation. It strives to document geohistorically specific ways soils – and their problems – are constituted by situating the problem of degradation within the evolving history of soil science (Barry, 2021). Located at the intersection of STS and the history of science, it draws on Latour's (1999) concept of "lively historicity" to explore the dynamic interplay between soil science, evolving soil materialities, classifications, and socio-political contexts.

Methodologically, the study combines archival analysis with interviews conducted with soil scientists from Turkey's Ministry of Agriculture and Forestry and agronomy faculties. Furthermore, drawing on Asdal and Reinertsen (2022), it critically reflects on how these documents function as tools, their work, and their movement.

The analysis conducted thus far highlights the significance of technoscientific cooperation in the making of soil studies and of soil degradation. That influence particularly concentrates around the following events: (1) the early Republican period, where German-trained agronomists emphasised chemical balance as a marker of soil health, viewing degradation primarily as a natural land-shaping factor; (2) the 1950s, American influence brought through Marshall Aid, framing degradation as a critical issue linked to erosion, yet simultaneously stirring the overuse of arable land; and (3) the early 2000s, Turkey's EU candidacy process and integration into global environmental frameworks redefining degradation through indicators like SOC levels, driving new research agendas and legal arrangements for soil protection.

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ID 433 - Space Diplomacy: an operational history

David Burigana, Università degli Studi di Padova

Keywords: Space Diplomacy, Science Diplomacy, Operational History, Entangled History, International History

We started talking on Space Diplomacy again with the "discovery" of Science Diplomacy (Ruffini, 2015), both in reality historical phenomena as shown by the H2020 InsSciDE Inventing a Shared Science Diplomacy for Europe (2017-22). History of International Relations can reconstruct them thanks to its methodology attentive to the interconnection of sources from the different countries involved without risking being trapped in a national or disciplinary context. However, is it enough? What impact does it have on the historiography dedicated to foreign policy? Do only politics and economics count in reconstructing the evolution of the international system? Can interpretations on Cold War or European Integration be enriched or even revised?

To replay, we need an approach based on entangled history, that is, based on a real interdisciplinarity not only, and not so much, within political and social sciences or humanities. It is about seeking consultancy and collaboration from STEM colleagues, and this for a better understanding of the evolution of science and technology, of the breaking points in innovation. This is where the concept of operational history comes into play, which should not be confused with public history. It is not diffusion of history, or public engagement in spreading the memory and history of events that have marked the evolution of society and which should not be lost precisely for the conscious growth of society itself.

Operational history - as recalled in its application to the life of a machine tool - takes note of the salient moments of a phenomenon, interpreting them for the transition to its next evolutionary phase to describe its current state, and suggesting possible development prospects. This is how operational history is applied to the protagonists, to the dynamics of Science or Space Diplomacy in events involving historians, witnesses of the recent past and actors of the present time in dialogue with each other to propose a state of art to Science and Space Diplomacy practitioners. These events are the schools at the University of Padua since 2021, and now at the first International School on Science & Diplomacy in October 2024 at the Ettore Majorana Center (Erice, Sicily) https://www.sciencediplomacy.it/ and the Observatory Space Diplomacy Italy at Padua University https://www.spacediplomacy.it/.

We will present two examples based on the interconnection between historiography, documents and interviews from different countries: the launch of the National Space Plan (1978-80) and the Giotto mission to meet Halley's Comet (1978-86). Both have had strong implications of Space Diplomacy, bilateral and multilateral, helping to design development strategies for space exploration. They represented real experiences of Science Diplomacy, in particular the Armada of probes meeting in Halley is the most relevant example during the Cold War of Space Diplomacy well beyond the 1975 docking between the USA and the USSR, for the countries involved, the typology of actors, the use of media and the impact on society.

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ID 515 - Models of Science Policy as Heuristics for Exploring the Meaning of "Science" in Science Diplomacy

Simone Arnaldi, Università di Trieste
Dejana Petranovic, Università di Trieste

Keywords: Science diplomacy, Science policy, Heuristics, Diplomatic Community

Science diplomacy has recently emerged as a significant area of public policy, attracting growing attention from both decision-makers and scholars. While much has been written about science diplomacy as a tool of foreign policy, less focus has been placed on how its discourses and practices are shaped by broader

understandings of the relationship between science and society – and consequently, by the different approaches to science policy that arise from these understandings.

This presentation proposes using post–World War II models of science policy as heuristics to explore the distinct ways these perspectives manifest in science diplomacy. As science policy discourse has evolved to emphasize the societal needs that scientific knowledge is expected to address and the broader involvement of social actors in its production, these representations of the science-society relationship can be used to analyze the current discourse on science diplomacy. The presentation highlights how these models are incorporated into science diplomacy discourse – albeit unevenly and often inconsistently.

To support this claim, the presentation will discuss the initial findings from a study of science diplomacy activities conducted by the Ministries of Foreign Affairs in Eastern and Southeastern Europe. The analysis demonstrates how the interviewed diplomats describe the goals and characteristics of their actions in terms that are consistent with the science policy models under consideration.

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ID 751 - From Global AI Governance to Strategic Containment: The New AI Cold War?

Merav Tordjman, Bar-Ilan University (תטיסרבינוא־רב וליא)
Denisa Kera, Bar-Ilan University (תטיסרבינוא־רב וליא)
Hila Ofek, Bar-Ilan University (תטיסרבינוא־רב וליא)
Odelia Natan, Bar-Ilan University (תטיסרבינוא־רב וליא)

Keywords: AI, Cold War, AI Governance, AI Diffusion, technological sovereignty

The shift from global and multilateral AI governance initiatives to national security-driven containment marks a critical turning point in technological regulation. As frameworks focusing on international collaboration like the Global Partnership on AI (GPAI) or OECD AI Principles give way to restrictive policies, a new paradigm of technological sovereignty emerges. This transition is best exemplified by the Framework for Artificial Intelligence Diffusion (IFR 0694-AJ90) that prioritizes export controls, licensing policies, and compute restrictions over making AI trustworthy, responsible, human centered etc., reflecting broader tensions between innovation and national security.

The securitisation of AI governance is evident in increasingly restrictive national policies: China's AI Security and Algorithm Regulations reinforce domestic control, Japan's AI Strategy 2022 emphasizes export security, India's AI Mission prioritizes defense applications, and Russia's AI Strategy focuses on Sovereignty & national security. Simultaneously, semiconductor supply chain rivalries – often described as the "Chip Wars" – intensify economic competition, creating new technological hierarchies that resemble but also transcend Cold War-era containment strategies.

This study examines three interconnected dimensions:

- The Transition from Global Governance to Containment Logic– How AI governance has shifted from international cooperation toward control and restriction.
- The Emergence of New Technological Blocs–How alliances between states and corporations reshape global AI ecosystems.
- The Convergence of State and Corporate Power–How governments and technology firms co-produce AI governance through infrastructure control, surveillance, and export policies.

Through an interdisciplinary framework integrating Science, Technology, and Society (STS) studies, Foucault's concept of governmentality, and Fearon's costly signals theory, this research investigates whether semiconductor and AI diffusion controls function as effective deterrents or, conversely, accelerate alternative technological ecosystems. Engaging critically with CSET's Decoding Intentions report, this study examines how initiatives like the U.S. CHIPS Act and China's Semiconductor Development Plan embed national security imperatives into AI governance and infrastructure.

The research raises a key question: Do contemporary AI containment strategies signal a new Cold War, or do they represent a more profound transformation in global power structures? By examining alternative AI ecosystems – such as China's DeepSeek and European AI initiatives – this study reveals the systemic limits of technological containment in an era where AI diffusion increasingly resists traditional geopolitical control.

Beyond conventional geopolitical analysis, this research reframes AI sovereignty as an infrastructural phenomenon, where access to compute, model weights, and semiconductor supply chains determines geopolitical influence. It synthesizes historical Cold War containment strategies with contemporary digital governance challenges, offering new theoretical insights into evolving relationship between technological power, economic competition, and AI regulation. Through comparative policy analysis and a critical examination of governance documents, this study illuminates the tensions between national security imperatives and inherently distributed nature of AI development, suggesting new frameworks for understanding technological sovereignty in an interconnected world.

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