Transnational Perspectives on Soviet Cutting-Edge Technology

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The conference brought together historians of science and technology from Europe and North America. It dealt with key issues of Cold-War knowledge and technology production and was organized by the bi-national research cluster NucTechPol (Tübingen, Heidelberg, Bern).

The conveners JULIA RICHERS and FABIAN LÜSCHER (Bern) opened up their own field of research (i.e., space and nuclear science) to include cutting-edge technologies more generally and to contextualize Soviet science in a transnational arena. As Richers and Lüscher argued in their opening comments, nuclear technologies, space exploration, or computing were to be seen in a transnational context, but the importance of national borders should not be forgotten: The privilege to cross the USSR's border was restricted to a relatively small group of Soviet scientists. Furthermore, dual-use technologies such as the ones named above were always of national importance and therefore subject to restrictions to transnational exchange. One aim of the conference was thus to assess the extent and limits of transnational cooperation in these disciplines, as well as searching for interconnections between different cutting-edge technologies within the Soviet realm – be they personal connections or epistemic traditions. A second goal set in the opening speech was to bridge the gap between cutting-edge technologies and the persistent image of Soviet backwardness. However, the new technologies also posed new challenges and threats, prompting Richers and Lüscher to call for an investigation into the relationship between progress and the price of being cutting-edge.

The transnational dimension was a cornerstone of numerous contributions. There was a consensus that Soviet cutting-edge science was in no case confined to national institutions and personnel. Rather, three central questions were raised concerning the transnational entanglements of Soviet science and technology.

First, all papers discussed the scopes and limits of cross-border and inter-bloc exchange. STEFAN GUTH (Tübingen) shed light on the history of nuclear-powered desalination on the Mangyshlak peninsula in the Kazakh Soviet Socialist Republic. Being the only site worldwide where this technology was actually employed, it attracted delegations from numerous countries and prompted close cooperation with desalination specialists from the United States and other countries. However, Soviet attempts to export nuclear-powered desalination failed. ROMAN KHANDOZHKO (Tübingen) too outlined the spaces and limits of transnational cooperation, drawing on the history of the proton accelerator in Dubna near Moscow. While this project was located at the political and scientific center of the Soviet state, it maintained cooperation projects and exchanges with foreign (also Western) researchers and institutions. However, the fact that the USSR never was an official member of CERN also marks the limits of cooperation.

Second, as DARINA VOLF (Munich) argued, cooperation and competition do not represent separate modes of scientific practice on the transnational level. As her historical analysis of the US-Soviet joint Apollo-Soyuz Test Project (1975) suggests, cooperation and competition were interdependent. Volf pointed out that cooperation with the respective other space superpower was a way for both NASA and the Soviets to reduce their expenses and assign new relevance to post-1969 spaceflight. Furthermore, the USSR needed to prove its oft-doubted openness towards cooperation in space. At the same time, Cold War competition was a key argument employed in order to gain support for the program, which promised both countries to remain at the highest technological level of spaceflight.

Third, the role of the technologies themselves was a matter of discussion. FABIAN LÜSCHER showed in his contribution on Soviet controlled nuclear fusion research how the immense challenges of creating a stable plasma and temperatures of 100 to 150 mil-

lion degree Celsius prompted international cooperation. Man-made nuclear fusion was, as Lüscher argued, too complex an endeavor for a single state. ANNA ÅBERG'S (Göteborg) study of the „global initiative" in nuclear fusion, an ongoing multilateral project in the south of France (ITER), underlined the continuity of transnational cooperation in this field. ITER pursues the goal that in case of success, all participating countries can build a nuclear fusion reactor on their own. The development and manufacturing of components is, therefore, subject to a complex structure of multilateral labor division.

According to SUSANNE BAUER (Oslo), the Stalin regime's approach to genetics usually serves as the prime example of how ideology interfered with science. However, there were at least two fields were geneticists continued their work even in the heyday of Lysenkoism. The threat of genetic mutation through radioactivity made genetics a key science in the nuclear age, and in the closed institutions of nuclear research, radiation geneticists were still occupied. In a connection between nuclear and space technology, Soviet geneticists found a second niche studying the effects of cosmic radiation on a variety of living organisms. Space medicine had extreme importance for human spaceflight, and Soviet expertise was acknowledged internationally.

In her talk about several nuclear disasters in the Chelyabinsk region, LAURA SEMBRITZKI (Heidelberg) discussed the catastrophic consequences of cutting-edge technology going wrong. The naïve handling of the nuclear programme ceased in the mid-1950s, when officials noticed the dangers to the area's population. Drinking wells were built and the operator of the plant was held responsible for damages caused. Access to most heavily polluted areas was restricted; in 1966, and turned into a nature reserve. However, as the Soviet administration had not taken daily practices of the rural population into consideration, the restricted access did not have the desired effect. Villagers continued to enter the forbidden forests to gather firewood. In spite of the efforts at secrecy, research results deriving from the disaster region were presented on the international scene. According to Sembritzki, the Cold War scientific competition was too important not to present such impressive results.

ASIF SIDDIQI (New York) analysed the Soviet reactions to Ronald Reagan's Strategic Defense Initiative (SDI). The official Soviet response to the partially space-based missile defense system was one of outrage, while the Party quickly planned to mirror the SDI with a system of their own. However, within the Soviet scientific sphere, criticism arose. Top-scientists deeply involved in these projects took a stance against the militarization of space. In their public protest, they took on key actors of the Soviet state. Arguing in the name of scientists on both sides of the Iron Curtain, they held that scientists should act as guardians of peace. There was a high degree of tension between the scientists' own involvement in weapons programmes while they criticised militarism.

The striving for transnational cooperation and the Soviet Union's efforts in the field of automated computing not only relied on diplomacy and massive financial investments. It also prompted translation efforts on multiple levels. KSENIA TATARCHENKO'S (Geneva) contribution on the translator Igor Pochitalin provided an actor-centered case study on this aspect of the transnational cutting edge. Pochitalin was part of such prominent encounters as the Pugwash conferences and the Apollo-Soyuz Test Project. Tatarchenko argued that „conventional" language was the central medium for the translation of science, rendering the translators key actors in the transnational sphere of cutting-edge science.

A different kind of translation was at the center of SLAVA GEROVITCH'S (Cambridge, MA) and FELIX HERRMANN'S (Bremen) studies. Elaborating on the history and personal networks of Soviet mathematicians and computer scientists, they highlighted Soviet efforts to translate scientific tasks into mathematical formula and automatically computable language. Gerovitch showed that the development of Soviet mathematics was closely related to the nuclear bomb program. The epistemic, personal, and institutional traditions of the latter soon translated into the structures of Soviet mathematics. Felix Herrmann focused on attempts to

establish a computer industry in the USSR. As Moscow tried to catch up with the U.S. in this field, its strategy to obtain advanced computer technology was cooperation with the West and within the Comecon. Technological companies from France, the FRG, and the UK were in contact with Soviet officials in the 1960s: The desire to translate the world into machine-readable units triggered global exchanges. The U.S. government, however, repeatedly vetoed such cooperation projects in the Coordinating Committee on Multilateral Export Controls (CoCom).

BENJAMIN PETERS (Tulsa) analysed how concepts of mass communication, broadcasting, the nuclear bomb and the human brain correlated. As Peters argued, the semantics and metaphors employed in all these fields show interrelations. The U.S. nuclear bomb attack on Hiroshima and Nagasaki created a violent and gigantic shutter (i.e., the bomb's flash), connecting its victims through the medium of the bomb. Peters detected ideas of a mass mind, connecting people to one single centre, not only in the example of the nuclear bomb. Similar semantics also translated into the spheres of broadcasting, nuclear fallout, and the human or mass mind.

The final discussion brought the participants back to the conference's key term: cutting-edge. The term does not only convey an optimistic and positive stance on the technologies discussed. It is also subject to diachronic change and the assessment of individuals and thought collectives. The question what „cutting-edge technology" meant in the Soviet context and whether it represents a useful analytical term, therefore, was the matter of the final discussion. The aspiration to expand the margins of human knowledge and technological possibilities of humankind (i.e., to be cutting-edge), was an integral part of Soviet science policy. The massive investments in spaceflight, nuclear energy and physical research led to a privileged position of these fields within the Soviet scientific community. This pattern of high expenditure on a few areas of research and development was not unique to the USSR, but nonetheless it developed path dependencies that up to now characterize Russian science and technology. In the context of the Cold War, presenting a certain technology as „cutting-edge" to decision makers was a key argument for scientists in the constant struggle for funding. The contributions on computing, nuclear research, and spaceflight showed that Moscow feared a widening technological gap between the Soviet Union and its Western adversaries. Thus, to frame a technology as a guarantee to stay on a level playing field with the West was vital to researchers and engineers when they navigated within the Soviet administration. „Cutting-edge technology" meant, if framed successfully, also „cutting-edge funding".

The „cutting-edge" is highly relevant when historians aim to understand and synthesize the interplay of different technologies with the Soviet bureaucratic apparatus. Their high cost, the transnational processes (preconditioned often, as FABIAN LÜSCHER showed, by the intrinsic logics of these technologies), and the question of translation into new epistemic systems such as different scientific traditions as well as computing language united the cutting-edge technologies. The most striking common feature, however, is the role of *'cutting-edge' as an argument* in the negotiation processes of science policy. One way to widen the scope of analysis could be to take into account former, „abandoned" cutting-edge technologies. The focus of the contributions remained on technologies that still shape the „cutting-edge" of 2019, i.e. computing, spaceflight, and, despite its notorious reputation, nuclear energy. This might lead scholars to turn a blind eye on technologies that historical actors once perceived as cutting-edge, but went by the board in the past decades. Whether technologies of (for example) propaganda and Lysenkoism were cutting-edge in certain periods of Soviet history could be of interest for further research on the analytical category.

The conference demonstrated that it is possible and fruitful to bring together scholars working on such different fields as nuclear energy, computing, and spaceflight. It shed light on the many interconnections between those fields and made a highly relevant contribution to grasping the possibilities and limits of transnational exchange in Cold War science. Furthermore, it proved that more research is necessary in order to put the different fields of

Soviet cutting-edge science in relation to each other. The Bern conference was an important step in this direction.

Conference Overview:
Introduction | Julia Richers & Fabian Lüscher, Bern

Panel 1:
Chair: Silvia Berger, Bern

Susanne Bauer, Oslo: Soviet Radiation Biology: Navigating Boundaries of Closed Worlds

Laura Sembritzki, Heidelberg: „Atomic Reserve" in the Southern Urals

Panel II:
Chair: Carmen Scheide, Bern

Roman Khandozhko, Tübingen: Accelerated Relationships: The USSR and the Rise of Megascience in Cold War High-Energy Physics, 1956–1991

Slava Gerovitch, Cambridge, MA: Explosive Math: Soviet Mathematicians, the Bomb, and the International Community during the Cold War

Panel III:
Chair: Julia Richers, Bern

Darina Volf, Munich: Apollo-Soyuz Test Project: Mutual Perceptions, Interdependencies, Cooperative Efforts, and Transfers between the Space Programs of the U.S. and the Soviet Union in the 1970s

Asif Siddiqi, New York: Soviet Science at the Edge of Nuclear Apocalypse Performing „Star Wars" on the International Stage

Panel IV
Chair: Tanja Penter, Heidelberg

Stefan Guth, Tübingen: To Be Taken with a Grain of Salt. Nuclear-Powered Water Desalination in East, West and South (1961 to Present)

Anna Åberg, Göteborg: Trust, Passion and Compromise: ITER and the History of Nuclear Fusion Diplomacy

Fabian Lüscher, Bern: Disillusion about Fusion. Failure as an Asset to Soviet Nuclear Internationalism, 1956–1968

Panel V
Chair: Klaus Gestwa, Tübingen

Ksenia Tatarchenko, Geneva: Putting Scientific Diplomacy into Words: Translation, Mediation and Public Communication in Cold War Big Science

Benjamin Peters, Tulsa: Brains, Bombs, and Other Smart Nuclear Reactors

Felix Herrmann, Bremen: A Global Industry. Transnational Entanglements of Soviet Computer Manufacturing

Final Discussion
Chair: Julia Richers & Fabian Lüscher

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