President Dwight D. Eisenhower made technological collaboration the core component of US nonproliferation strategy with his “Atoms for Peace” speech in December 1953. In *Sharing Knowledge, Shaping Europe*, John Krige deftly explores the relationship between technology and diplomacy in the European context. Krige has long been interested in revealing how policymakers in Washington, DC, valued the country's scientific and technological primacy as a form of soft power. His earlier work, *American Hegemony and the Postwar Reconstruction of Science in Europe* (2006), brought attention to US efforts to employ its scientific and technological supremacy to underwrite the postwar projects of European reconstruction and alliance formation. His latest effort reads as a sequel, revealing through cases studies the evolving tensions in US-West European collaboration on dual-use technologies and nonproliferation policies in the early Cold War. Ultimately, national ambitions in Europe tempered the success of US nonproliferation policies that hinged on technological collaboration as an incentive for integration.

Euroatom's creation takes center stage in the first two chapters. Relying on seldom-used State Department documents not published in the *Foreign Relations of the United States* (FRUS) series, Krige determines that the State Department and the Atomic Energy Commission (AEC) contested US policy on Euroatom. The AEC agreed to supply generous amounts of fissile material to independent national nuclear programs in Europe, which came at odds with the State Department's intention to share nuclear technology with Euroatom as a seed for integration. Industrialists and State Department officials argued that a federalized Europe in turn served Washington's nonproliferation aims by providing a multistate safeguard regime that inhibited European ambitions of building a nuclear weapon. This strategy benefited US industry by checking London's commercial plans for nuclear energy. A lack of materials and scientific manpower forced London—and all European partners—to choose between the commercialization of the national nuclear establishment or joining in the Euroatom project. The United Kingdom, however, had little incentive to join Euroatom, for its partners could not reciprocate the technical knowledge that Britain had to offer. Britain hoped to see a return on the millions of pounds invested in its superior nuclear energy sector by dominating the European market. Whitehall’s subversive efforts to use its lead in nuclear energy technologies to incentivize its particular vision of European economic cooperation were thwarted by strong objections from Secretary of State John Foster Dulles, who relied on oth-
er forms of US soft power to moderate Whitehall’s actions. In Krige’s estimation, the process of reconciliation between the AEC and the State Department, Washington and Whitehall, integration and national ambition, squandered the United States’ opportunity to maximize the diplomatic benefits of its technological lead and prized fissile material. The ideal version of Euroatom in the eyes of the State Department benefited American commercial interests in Europe, accelerated integration, and served as a bulwark against proliferation; instead Euroatom emerged only as a “diluted mode of integration,” that failed to diminish the prospects of proliferation or advance US economic interests on the Continent (p. 77).

In chapters 3 and 4, Krige probes connections between US nonproliferation goals and cooperation with Europe in outer space. The question of German rearmament grew more and more problematic as nonproliferation became a significant focus of the Johnson administration. Abandoning the nuclear pacifism of the Adenauer years, Chancellor Ludwig Erhard sought a hardware solution to resolve West Germany’s security concerns and matters of national prestige. The prospect of a multilateral force (MLF)—composed of American and British nuclear submarines manned by NATO crews—had gained favor in Bonn and became a sticking point in US relations with the Federal Republic of Germany (FRG). The Johnson administration, however, recognized the damage such an agreement would cause to Nuclear Non-Proliferation Treaty negotiations with the Soviet Union. In place of the MLF the Johnson administration offered a software solution, increased influence over nuclear decision-making as a permanent member of the newly established NATO Nuclear Planning Group (NPG). Cooperation on a solar probe and satellite development were intended as alternative sources of technological prestige that might have otherwise been produced by a hardware solution to the FRG’s nuclear ambitions. The administration considered these offers together to be an effective strategy of “positive disarmament,” which had the added benefit of reducing the “technological gap” between the United States and Western Europe. The Johnson administration figured space collaboration could shepherd the technical talent and financial resources of the FRG into an industry in which reciprocal benefits could be enjoyed, thus correcting the one-directional flow of knowledge, techniques, and money that had characterized the technological relationship between the United States and Western Europe in the postwar years.

Krige faults US policymakers for viewing technological soft power as a panacea to alliance problems. Washington and Whitehall’s nonproliferation policies clashed over the continued operation of the European Launcher Development Organization (ELDO), a predecessor to the European Space Agency. Following the cancellation of Blue Streak ballistic missile program in 1960, the British searched for ways to see a return on investment sunk into the failed weapons program. In ELDO, Krige posits, the British “saw a European solution to a British problem” (p. 99). Recycling Blue Streak as the foundation for rocket collaboration appealed to European partners. France needed effective delivery systems following its first successful atomic test in 1960, and the FRG along with smaller countries could compensate for years of inactivity in the rocket industry by joining forces with the advanced British and French programs. Policymakers in Washington viewed ELDO much the same as Euroatom, an organization that incentivized integration, reduced the technological gap, and inhibited proliferation of weapons systems. However, by 1965, Britain’s persistent postwar financial problems forced the Harold Wilson government to reconsider its commitment to ELDO. The Wilson government’s February 1966 notice to European partners of its intentions to withdraw from ELDO alarmed US officials. Only the willingness of European partners to reduce Britain’s financial contributions to ELDO guaranteed continued involvement. Conversely, US offers to expand collaboration were misguided. Solly
Zuckerman, Britain’s chief government scientist, and most of Whitehall considered such offers a “trap—a mode of control that would unduly curb HMG’s freedom of action in launching both military and commercial telecommunications satellites” (p. 117).

By the 1960s, advances in gas centrifuge uranium enrichment brought a new challenge to US nonproliferation policy, which as Krige notes early on, “was made with one eye on the needs of American industry” (p. 13). Focusing specifically on US-UK competition in gas centrifuge technology in his final chapter, Krige argues that the promise of cheaply produced fissile material from Britain’s nuclear establishment threatened to break the US monopoly on material supply to national civilian and military nuclear programs. Britain’s advances in centrifuge technology exposed potential contradictions in the State Department’s nonproliferation goals. Whitehall organized Urenco as a corporate collaboration with the Dutch and West Germans in the field of nuclear energy. The United Kingdom Atomic Energy Authority (UKAEA) framed the Urenco proposal in terms consistent with Washington’s nonproliferation aims. Whitehall organized Urenco as a corporate collaboration with the Dutch and West Germans while putting pressure on France to lift its objections to the UK’s application to the European Economic Community at the risk of technological isolation. Britain could monitor the use of fissile material in the FRG’s nuclear program, which demonstrated the West’s willingness to constrain Bonn’s nuclear ambitions during Nuclear Non-Proliferation Treaty negotiations with the Soviet Union. However, Urenco endangered the US control of fissile material in the world market. Under the auspices of the 1955 US-UK cooperative agreement on civil uses of atomic energy, the State Department carried out industrial espionage on behalf of corporate interests. Washington’s insistence on inspecting British centrifuges to ensure compliance with the 1955 agreement allowed US scientists and engineers to closely examine British technology and in effect, evaluate its commercial potential. American technical personnel concluded that British centrifuge designs, the end caps specifically, were far less efficient than US centrifuges in the production of highly enriched uranium. With commercial competition no longer a concern, Washington endorsed the establishment of Urenco.

Marc Trachtenberg’s question, “what makes a stable international system?” precedes Krige’s investigation of early US nonproliferation efforts (p. 3). He explains what US officials thought made for a stable system, but more importantly, he demonstrates how the broad arc of their policies was made operational by the scientists and engineers who infused politics into dual-use technologies. This argument is a significant reconceptualization of US foreign policy; he speaks to Joseph Nye’s conception of soft power, or co-optive rather than coercive force, by framing US nonproliferation policy as a technological system. Through this lens we see the flexibility and failure of nonproliferation as a technological-system-in-the-making; a dynamic and “evolving organism” that is constantly reshaped by new knowledge and the rearrangement of components (p. 158). Krige’s framing of US foreign policy as a technological system is the antidote to determinism and illustrates how concepts prevalent in the historiography of science advance our understanding of US foreign relations.

The blending of the robust historiography of the Cold War with that of twentieth-century science is one of the exceptional aspects of this book. Inherent in his technological-system-in-the-making framework are concepts developed in Langdon Winner’s works that cast technologies as political artifacts. Yet, Krige’s argument begs inclusion in many other historiographies. Competition between the United States and the United Kingdom in dual-use nuclear and space technologies has rarely been considered by historians who study the “special relationship.” The US govern-
ment’s attention to private nuclear energy interests fits neatly within the corporatist synthesis, which holds that coordinated foreign policy with multinational corporations enabled the global projection of soft power. Krige’s attention to those private interests that emphasized civilian aspects of dual-use technology and encouraged the US government to rely on soft power is a tacit rebuke to the militarization of science thesis—clearly a more nuanced multilateral relationship existed between science, government, and industry.

Krige’s well-selected case studies give readers a thorough outline of the players and events that shaped early US nonproliferation policy, but other issues could be usefully included. He explains that the US government very much considered commercial factors, but few sources illustrate the actual viewpoint of the industrialists themselves. Commercial rivalry with the United States clearly shaped Whitehall’s policy decisions on nuclear energy—in the context of this competition, a discussion of the Windscale meltdown shortly before Harold Macmillan’s meeting with US officials on nuclear cooperation seems appropriate. Considering Krige’s focus on soft power, it is fitting that he focuses on the European Economic Community as the primary mode of integration. However, any discussion of West German nuclear ambitions in the 1960s merits discussion of De Gaulle’s withdrawal of French nuclear forces from NATO’s command structure and the subsequent nuclear planning reforms brought on by the Harmel Doctrine.

Nonetheless, Krige has given readers much to contemplate in this compact volume. Policy professionals will do well to ponder positive disarmament as a scheme for using alternative prestige projects to divert essential technical talent from the nuclear weapons enterprise. Historians of science and diplomacy can coalesce around the notion of foreign policy as a technological system. Lastly, students at all levels now have a definitive account of US nonproliferation policy before the onset of the Nuclear Non-proliferation Treaty regime.
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