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Eisenhower, Sputnik, and the Creation of PSAC, 1957

On the evening of October 4, 1957, American physicist and ODM-SAC member Lloyd Berkner was attending a reception for International Geophysical Year scientists at the Soviet embassy in Washington, DC, when a *New York Times* reporter told him that the Soviets had just launched a satellite. Berkner immediately announced the news and congratulated the Soviet scientists present on their achievement.¹ In short order, the Sputnik news spread like a wildfire and promised to change, among other things, the science–state partnership and put the hitherto obscure scientists on the ODM-SAC into the public spotlight.

Sputnik, or “fellow traveler [of the earth],” evoked intense but mixed feelings in the American people. Ever since American scientists and engineers produced the atomic bomb and other technological wonders to win World War II, their countrymen had generally assumed that the U.S. domination in science and technology was unquestionable. Few were aware or cared about the fact that Europe had led the world in science until the 1930s. Even scientists who knew better about Soviet strength disbelieved that a totalitarian system that had brutally suppressed scientific freedom, as in the Lysenko scandal only a few years before, could achieve such technological excellence. Vannevar Bush, for example, had declared in 1949 that “We can take comfort in the conviction that dictatorship will seldom pioneer, and that when they do the dictator will probably buy gold bricks. . . .”² Now Sputnik inspired in the American public not only a sense of shock, but also admiration for this unique human endeavor. Amateur astronomers from coast to coast gazed into their telescopes searching for the artificial moon. Others tuned to their radios to listen to the sharp beeps emitted by the satellite as broadcast by CBS and other networks.³

As Sputnik brought the world into the shrinking global village, many Americans also recognized the end of U.S. safety through isolation. It was a rude awakening to the nation’s vulnerability. The fact that the rocket that had launched Sputnik could also serve as an ICBM to deliver an H-bomb to its target led many Americans to wonder whether the country had lost not only the competition for national prestige, but also the nuclear arms race. Just a few weeks prior to Sputnik, Khrushchev’s boast of a successful launching of an ICBM had been met with skepticism in Washington. Some even thought that Sputnik itself was merely a propaganda trick. However, when the Soviets launched Sputnik II on November 3, 1957, with an incredibly large half-ton payload and a live dog, all doubts vanished.⁴ With Sputniks beeping overhead, all other Soviet propaganda appeared perilously true: their gross national product grew at a faster rate than that of the United

States and would soon surpass it; they were producing twice as many engineers as the United States; other countries would adopt the Soviet political system and the United States would be isolated in the world.

Dire warnings from politicians and scientists soon radiated from Washington. Democratic Senator Henry M. Jackson characterized Sputnik as “a devastating blow to the prestige of the United States as the leader in the scientific and technological world.”⁵ Lyndon Johnson, Democratic majority leader in the Senate, held headline-making hearings on the nation’s satellite and missile programs. As the lead witness, Edward Teller, whose portrait appeared on the cover of *Time*, gave alarmist testimony. His warning that the Soviets were winning the race in military technology and in scientific research was confirmed by two venerable figures in American science and defense, Vannevar Bush and James Doolittle. To drive the point home, both Teller and Johnson pronounced the Sputniks a worse defeat for the United States than Pearl Harbor.⁶ Underneath the Cold War rhetoric was a strong sense of wounded nationalism.

Partisan polemics reached a height in Washington that had not been seen since the acrimonious debate over “who lost China” several years earlier. Democrats accused the Eisenhower administration of lacking leadership and vision and putting budget before national security. Senator John F. Kennedy (D-MA), for example, criticized it for “complacent miscalculations, penny-pinching, budget cutbacks, incredibly confused mismanagement and wasteful rivalries and jealousies.”⁷ Capitalizing on the so-called missile gap, Kennedy, Johnson, and other Democratic presidential hopefuls began preparation for the 1958 congressional and the 1960 presidential elections.⁸ In response, the Republicans blamed the Truman administration for delay in starting the missile program and the Democratic-dominated Congress for reducing Eisenhower’s request for defense funds. Such partisan bickering largely drowned out the voices of many intellectuals and concerned citizens who called for a thoughtful national self-examination.⁹

In this tense atmosphere, scientists, because of their prominent role in both the missile and satellite programs, came under attack. Senator Styles Bridges (R-NH) blamed them for the missile lag because they “were beguiled by the peace and light emanating from the Kremlin.” “The time has come,” he claimed, “not to ask our scientists what to do, but to tell them what must be done.”¹⁰ Unaware that the rocket, not the satellite, was the bottleneck of the American program, some members of the public charged scientists’ “gold-plating” of the satellites as the cause of the nation’s humiliation. One Texan constituent complained to Johnson that the “brains” did not understand the feeling of the people. If they did, “they would have shot a waste basket, a filing cabinet or anything up there.”¹¹

Whereas scientists appeared soft-headed, incompetent, and out of touch to their critics, they stood out to others as unsung heroes laboring in an environment of neglect and hostility. Whether accurate or not, former President Truman’s diagnosis that McCarthy-style “character assassination of Oppenheimer” and other scientists had led to the loss by the United States of the satellite race resonated within the scientific community.¹² Several of Oppenheimer’s supporters within

ODM-SAC, including Rabi, then ODM-SAC chairman, now called publicly for a redress of his case, “as elementary justice.” Rabi also agitated for Oppenheimer’s reemployment by the government—only then “will it indicate that a change of heart has occurred.”¹³ The administration, however, resisted reopening the Oppenheimer case. One NSC official privately characterized the scientists’ request as scapegoating the security system when they were “unable to equal some of the scientific feats of the Soviets.”¹⁴

Sputnik was not the first technological spectacle to bring the power of science to national conscience—the atomic bomb and other technology-based weapons during World War II had already done so. However, Sputnik coupled science and technology with the pursuit of national prestige in a way that touched a raw nerve in a society already rattled by the Cold War. Thus, when the news came from Stockholm on October 30 that the Nobel Prize for physics had been awarded to two Chinese American physicists—Tung Dao Lee of Columbia and Chen Ning Yang of the Princeton Institute for Advanced Study—it provided both a welcome relief and a cause for concern. When the duo traveled to Sweden to receive the awards in December, American officials kept “an anxious eye” on them for fear that China might woo or snatch them away; the FBI relaxed only when the pair promptly returned to the United States.¹⁵ Eventually, traditional American enthusiasm toward technology would return with a vengeance as a reaction to the Sputnik challenge, but in late 1957, the American public lived in the shadow of a technological defeat. Eisenhower, even years later, could not believe the near panic that had greeted Sputnik—“its light was blinding.”¹⁶

In part, the Eisenhower administration had itself to blame for the way Americans reacted to Sputnik. Prior American rhetoric, such as that advanced by Strauss, had always identified the superiority of the American system with its technological and military prowess.¹⁷ Eisenhower himself had never given the U.S. satellite program the highest priority that the Soviets did. Even though the Killian TCP report of 1954–1955 had urged the United States to launch the International Geophysical Year satellite program as a way to legitimize its reconnaissance satellites, and many people, including the ODM-SAC and Eisenhower himself, recognized the satellite’s significance for national prestige, apparently none believed the Soviet Union could really beat the United States.¹⁸ Thus there was a sense that the American International Geophysical Year satellite would serve its strategic purpose better if it was pursued as an internationally open scientific project, rather than a crash military endeavor. In the same spirit, Eisenhower had approved in 1955, on recommendation from Assistant Secretary of Defense Donald Quarles, that the U.S. satellite project, called Vanguard, be established as an NSF project using a relatively new rocket built by the Navy, instead of utilizing the advanced Redstone military rockets developed by the Army.¹⁹ Such an arrangement, as Quarles reminded the cabinet two weeks after Sputnik, had been meant to “obviate or weaken Soviet protest on over-flight.”²⁰ Now Sputnik actually “has done us a good turn,” as Quarles told Eisenhower in a separate meeting, by nicely establishing the “freedom of space” for everyone, paving the way for American reconnaissance satellites.²¹

In a way, the fact that the Soviets used a military rocket for launching the satellite was actually reassuring to the Pentagon and Eisenhower. It indicated that the Russians gave higher priority to space than to ICBMs, which would in turn imply that they did not think that the United States was going to start a war against them and that they wanted to wage the Cold War more in psychological than military terms.²² This understanding, coupled with his knowledge of the real Soviet strength from the U-2 reconnaissance overflights, led Eisenhower to react calmly to the Sputnik launch. For security reasons, however, he could not disclose the U-2 information to the public, which limited the effectiveness of his response to the Sputnik challenge.

The Origins of Presidential Science Advising

Despite his conviction that Sputnik, per se, represented no major strategic threat (and indeed some benefits) to the United States, Eisenhower still had to calm the hysteria and mitigate the public alarm. He took several measures behind the scenes to speed up the American satellite program, but his appointment of James Killian as science adviser and the reconstitution of the ODM-SAC into the President's Science Advisory Committee formed the most publicly prominent part of his response to the Sputnik challenge. Conventional accounts of this process render it as mainly a matter of science in policy: Sputnik made the president recognize his need for science advising in space and defense policy and he then proceeded to establish it.²³ However, this narrative of natural evolution does not explain why Eisenhower chose Killian and the ODM-SAC scientists, instead of their opponents led by Edward Teller or Ernest Lawrence, as his science advisers. After all, in the pre-Sputnik days Teller and Lawrence were equally if not more prominent scientific figures than ODM-SAC scientists. They certainly wielded more influence than the latter in U.S. nuclear weapons policy. What the conventional account masks is the role played by a crucial debate among these opposing scientific camps and policymakers over the meaning of Sputnik for American science and technology policy, especially nuclear weapons policy. In the end, the establishment of the science advisory system had to do with both science in policy and policy for science.

Even though Sputnik provided the direct trigger for the establishment of the PSAC system of science advising and with it the incorporation of moderate scientists in policymaking, at least three prior or concurrent developments shaped Eisenhower's choices of scientists. The first and most important factor was Eisenhower's profound rethinking about the course of the Cold War and the nuclear arms race, as he indicated in his meeting with the ODM-SAC in March 1957. "There will be no such thing as a victorious side in any global war of the future," he told the nation during a subsequent press conference.²⁴ Related to this turn toward serious arms control was Eisenhower's increasing disenchantment with the technological push of the Teller-Lawrence-Strauss group. In the summer of 1957, for example, in response to the clean bomb campaign by Teller, Lawrence, and Strauss to derail a nuclear test ban, Eisenhower acknowledged the potential benefits of the research in reducing civilian casualties in a nuclear exchange and

in peaceful applications, but resented their implication that a test ban was thus immoral. They made it “look like a crime to ban tests,” he complained after the meeting.²⁵ The incident also led him to observe bitterly that “the scientists today in this field seemed to be running the Government rather than acting as servants for the Government.”²⁶

Concurrent with these developments was Eisenhower’s increasing attraction to the ODM-SAC group for both its advocacy of a moderation of the arms race and for its linking of federal support of basic research with curbing the technological push. Thus, on October 8, in his post-Sputnik consultation with Detlev W. Bronk, president of the NAS, he warmed to the latter’s recommendation that he revive William Golden’s original proposal for a presidential science adviser and advisory committee by consulting with Rabi and upgrading the ODM-SAC.²⁷ Coincidentally, Eisenhower had, prior to Sputnik, requested to meet with the ODM-SAC on October 15 to discuss its report on basic research. He now appreciated it even more as an opportunity to discuss the Sputnik crisis with a group of prominent American scientists, especially Rabi and Killian, who had commanded his admiration and confidence.²⁸

For their part, Rabi, Killian, and their ODM-SAC colleagues also looked forward to the meeting. They had been just as surprised by Sputnik, especially by its political impact, as everybody else, despite their own earlier warning of just such an event.²⁹ “I was really astonished,” recalled Rabi years later.³⁰ As Hans Bethe recalled, most American scientists had thought “that the Russians were somewhat behind us.”³¹ Still smarting from the Wilson cut in basic research funding, ODM-SAC scientists saw the meeting with Eisenhower as a golden opportunity to strengthen the scientists–government relations and to promote federal support of science. Rabi, for example, “knew something would happen.”³²

On October 12, Rabi met with Andrew Goodpaster in the White House to plan for the committee’s conference with the president three days later. “Advice to the president on science” was already on the meeting agenda, including the possibility of the appointment of a special assistant for science and upgrading the ODM-SAC to a level comparable to the Council of Economic Advisers.³³ The day before the meeting with the president, Rabi convened the Science Advisory Committee, which decided to recommend the preceding steps as well as other changes in science and defense policies to Eisenhower.³⁴

At the October 15 meeting, Eisenhower opened the discussion by posing a question about government support of science, the original theme of the meeting. Still remembering the pre-Sputnik debate on basic research he touched off in the Cabinet, Eisenhower told the scientists that he had been reflecting “very earnestly” on the best way to support science. According to Goodpaster’s notes:

He said it was all well and good to accept the importance of basic research, but government officials have some responsibility to assure that money provided is actually used for research, and not diverted to other ends. However, to do so might result in intrusion into university activity.³⁵

Obviously the debate in the spring and the impact of Sputnik had softened the edges of Eisenhower's criticism of federal support of science. He was no longer questioning such support, although his concern over maintaining a public-private boundary—public accountability and private autonomy—remained and would later find general expression in his farewell speech. Welcoming this shift in Eisenhower's thinking, Rabi sought to transform the debate even further into a matter of administration. He told Eisenhower that the question of government management of research was of central concern to his committee and proposed that it conduct a study on the issue for the president. Eisenhower readily approved.

Then the discussion quickly turned to the burning question of whether American science already lagged dangerously behind that of the Soviet Union. Rabi's answer was both reassuring and alarming. The United States still enjoyed some advantages, he told Eisenhower, but the Soviets had picked up momentum. "Unless we take vigorous action," he predicted, the Soviets could surpass the Americans just as the Americans had overtaken the Europeans in science in the last generation. Following Rabi, Edwin Land spoke "with great eloquence" about the urgent need for presidential action. Land lamented the American obsession with mass production and consumerism and its loss of the pioneering spirit to the Soviets, who pursued science "both as an essential tool and a way of life." Describing the current feeling of scientists as "isolated and alone," Land pleaded with the president to break American complacency and inspire American youth toward scientific adventure. Although Eisenhower disagreed with Land on the advantages of the elitist Soviet education system (they were "picking out the best minds and ruthlessly spurning the rest"), he promised to do his part to create a better attitude toward science in the United States. Thanks to Sputnik, he added, "people are alarmed and thinking about science." By giving speeches and public recognition to scientists (including establishing the national science medals), Eisenhower hoped to turn this alarm to constructive ends.

Rabi then came to the main recommendation of the ODM-SAC: the appointment of a presidential science adviser. According to Goodpaster's notes,

Dr. Rabi said that many of the policy matters that come up to the President have a strong scientific component. He pointed out that the President lacks a scientific adviser, or someone who can provide him with a scientific point of view. The President said it might be well to have such an adviser, or even a small section, to support him. He said the group would have to recognize, however, that every such individual added simply adds to the burdens of the Presidency—but perhaps the individual could be a great help in getting the right point of view across. He said he would like to hear something more specific as to their ideas.

Rabi answered that he believed "the first essential is to get someone the President could live easily with (in the sense of working with him agreeably)," and "completely sound scientifically." Killian suggested "a committee to back up" the science adviser, with which Eisenhower agreed, mentioning the Council of Economic Advisers as a model.

The more Eisenhower reflected on the idea of a science adviser, the more enthusiastic he grew. "Such an individual could be most helpful," he told the scientists. A science adviser could assist him in keeping track of the government's decisions related to "scientific matters," he said, such as the one he made in 1955 to give the highest priority to ballistic missiles. That decision, Eisenhower complained, did not get fully implemented due to secondary considerations at the Pentagon. As another example, Killian mentioned the disarray in military R&D in the DOD and the demoralization of the scientific community. The need, Killian said, was "more for leadership than for money." A sympathetic Eisenhower immediately asked Goodpaster to arrange for the committee to meet his new secretary of defense, Neil McElroy, on the subject.

It is worth noting here that both the scientists and Eisenhower adopted fairly fluid definitions of the boundaries between science and technology and between science in policy and policy for science: missiles were hardly "scientific matters" and scientific demoralization derived more from the cut in funding for science than from any weakening in the government's use of science. Yet, the nature of the Sputnik crisis allowed ODM-SAC scientists to connect policy for science with science in policy. In the same vein, the scientists urged Eisenhower to strengthen scientific cooperation with the allies. A joint scientific committee with the NATO allies was mentioned (and later established). Rabi suggested a science adviser to the secretary of state. Albert Hill and others called for removal of security restrictions in information exchanges with allies, especially the British. Again, Eisenhower was most receptive. He immediately asked Cutler and Goodpaster to explore ways to implement these ideas.³⁶

Although, as we have seen, Rabi had cleared most of these proposals with the White House staff, if not President Eisenhower himself, prior to the meeting, its significance as a creation moment for the modern presidential science advisory system was recognized and would be long remembered by American public scientists. Years later, Bethe recalled it as "one of the most memorable hours of my life. . . . I have never before been present at a session where so much was decided in such a short time. Eisenhower was most impressive."³⁷ The receptiveness of the president to their proposals clearly excited and energized the scientists. For his part, Eisenhower appreciated the scientists' reassurance of present U.S. strength and made good use of it in his effort to calm the public and fend off political attacks. At the same time, he took the scientists' warning about science education and basic research seriously, and soon made these subjects major items on his post-Sputnik agenda. It is doubtful that the American response to Sputnik would have emphasized science and education so much if not for the strong influence of science advisers such as the ODM-SAC.

In retrospect, what was at stake in the meeting was no less than the negotiation over the meaning of the Sputnik challenge itself. With his Pearl Harbor analogy, Edward Teller was especially effective in leading the charge, in both Congress and in the media, that Sputnik represented a military and technological defeat for the United States and that it had to respond accordingly by accelerating its nuclear

weapons and other defense programs. Even though he agreed with the ODM-SAC scientists about the Soviet challenge in science and education, the thrust of his concern over Sputnik was military and technological. Just two days before Eisenhower's meeting with the ODM-SAC, Teller had issued a clarion call in the *Los Angeles Times* under the headline "We Must Win the H-War before It Starts!" Contrary to Eisenhower's conviction about the absurdity of nuclear wars, Teller demanded that "we must overcome the popular notion that nuclear weapons are more immoral than conventional weapons" and that "we must revamp our military planning to flight and win a limited nuclear war."³⁸ Much of what Eisenhower would later call the military-industrial complex resonated with Teller's analysis. It pushed on its own for a countertechnological attack that would eventually spill over into other areas of American life, resulting in a new wave of technological enthusiasm in Sputnik's shadow. Of course, such a reaction placed the institutions of American military technology—including Teller's Livermore Laboratory—in the forefront of American Cold War strategy.

In contrast, at the White House meeting, Rabi, Killian, and their colleagues, with their own interpretation of the boundary between science and technology, attempted, with considerable success, to turn Sputnik into a challenge in science, education, and presidential science advising. Like Teller, they did so partly out of conviction and partly out of their own institutional self-interest, for their interpretation of Sputnik would lead to increased funding for science and science education, with benefit for the universities, home institutions of most ODM-SAC members. Thus, despite their differences, both groups would contribute to what historian Walter McDougall called "another American lurch toward technocracy" in the wake of Sputnik.³⁹ For his part, Eisenhower was not unaware of ODM-SAC scientists' self-interest, but on balance he accepted their version of the challenge because it helped him devise a response strategy that would promote his own agenda of arms control and fiscal conservatism. He even began to appreciate their argument that federal support of basic research might help curb the technological momentum behind the arms race itself. Ultimately, it was this agreement between the president and his science advisers that paved the way for the establishment of a peacetime science advisory system in the White House for the first time in American history. Thus, even though all parties involved in the debate over Sputnik—Eisenhower, the Democrats, ODM-SAC scientists, and Teller—shared what historians have called an "ideology of liberal consensus" on the need to fight communism abroad (and to solve domestic problems through incremental reforms, not radical revolutions), they differed sharply over the limits of nuclear weapons in this struggle.⁴⁰

The cordial atmosphere at the October 15 meeting left little doubt that Eisenhower would look to the ODM-SAC for his first science adviser. Although no name was mentioned at the meeting, Killian, for his performances in directing the TCP in 1954–1955, in chairing the President's Board of Consultants on Foreign Intelligence Activities, and for his prominent position as MIT president, quickly emerged as Eisenhower's and his staff's favorite choice. A political moderate, he had been attacked by the right wing for protecting left-wing faculty members at MIT and for

his association with Oppenheimer, but his TCP investigation had also established his credibility with the military establishment.⁴¹ Although not a working scientist himself, Killian had the reputation of a brilliant science administrator. He knew both the scientific community and the government well enough to be an effective liaison between them. Conceivably, his nonscientist background might actually have made other White House staff feel more comfortable in working with him. His friendship with Congressman John McCormack, the Democratic majority leader in the House, did not hurt him either.

Another logical choice would have been Rabi: He not only knew Eisenhower well, but also, unlike Killian, was “completely sound scientifically.” Was he ever considered? Goodpaster remembered Rabi declining the position—“Rabi felt that it simply was not possible for him to undertake the job”—implying that it was offered to him, but Rabi recalled neither receiving a formal offer nor having great enthusiasm for it. In retrospect, Rabi cited his religious (Jewish) background and possible attack from the right wing as his, and possibly the White House’s, concerns.⁴² His advocacy for arms control both during the H-bomb debate and after would have led to opposition from the national security establishment as well. Cutler, who was attuned to the concerns at the Pentagon and the AEC and who had just clashed with Rabi over his proposed study of American commitment in the world, clearly favored Killian over Rabi, too.

Once the White House reached consensus on Killian, things moved rapidly. A few days after the White House meeting, Sherman Adams, Eisenhower’s chief of staff, called Killian and asked him to come back to Washington for discussion on the matter of a science adviser. After a conference with Rabi, Land, Berkner, James Fisk, Mervin Kelly, and Bronk in New York, Killian drew up a memorandum on the appointment of a presidential science adviser and the transfer of the ODM-SAC, with enlargement, into the White House. At breakfast in the White House, Killian met with Adams and Cutler, who had drafted a similar memorandum on the subject. Killian was subsequently asked to combine his with Cutler’s memo and come up with terms of reference for the new science adviser and advisory committee.⁴³ On October 24, Killian had breakfast with Eisenhower, who formally asked Killian to be his special assistant for science and technology (commonly known as the science adviser). Killian accepted the offer after securing a leave of absence from MIT.⁴⁴ Although the exact setup for a science advisory committee was not yet decided, a major step in the history of American public science was accomplished.

The Rabi Committee vs. the Teller–Lawrence Group

As the White House deliberated over whether to upgrade the ODM-SAC or try a new setup like the Council of Economic Advisers, another sequence of events took place that might well have both reaffirmed Eisenhower’s decision to shift his trust from the Teller–Lawrence group to the Rabi–Killian group and led him to approve the establishment of PSAC out of the ODM-SAC. On October 29, 1957, Rabi, as chairman of the ODM-SAC, met with Eisenhower in the White House to report a finding by his committee that nuclear explosions could prematurely detonate

unprotected warheads within several miles. Although the United States had already started shielding its warheads against this effect, the Soviets apparently had not yet caught on. Thus, the committee recommended that, first, the United States develop an antimissile system based on this effect, and, second, the United States quickly reach a test ban with the Soviets to prevent them from finding out the secret.⁴⁵ Eisenhower reacted favorably to the Rabi proposal. He even agreed with a poignant comment by Rabi that it was a “tragedy” that the United States had not reached a test ban early enough, as ODM-SAC had suggested, to prevent the Soviets from testing their thermonuclear warheads in their latest test series. Eisenhower recalled that he himself had often expressed a desire for a test ban to “freeze our advantage.”⁴⁶

Eisenhower’s warm reception of Rabi’s test ban advice alarmed Strauss, who also attended the meeting. He told Eisenhower that he and his scientists questioned some of the assumptions and conclusions of the ODM-SAC study. The AEC believed, for example, that the Soviets could always “steal our secrets” or conduct tests secretly. As a compromise, Eisenhower agreed that scientists holding different views should get together and try to reach a technical agreement on the proposal.⁴⁷ After Rabi left, Strauss tried to plant more doubts about the Rabi proposal in Eisenhower’s mind. He told the president that Rabi was a brilliant scientist and “a friend of long standing,” but the ODM-SAC proposal was not thought through. It lacked mature and experienced judgment about the broad concerns of national security and international relations. Interrupting him, however, Eisenhower reiterated his agreement with Rabi on the need to freeze the U.S. lead.⁴⁸

The Rabi meeting made a deep impression on Eisenhower. Months later, when reviewing U.S. policy on the test ban, Eisenhower singled out the Rabi meeting as the pivotal event that prompted the administration to enter into serious test ban negotiations with the Soviets.⁴⁹ It also made Eisenhower keenly aware of the deep division within the scientific community over American nuclear policy. At one point in the meeting, Rabi stated bluntly that he thought it a mistake for Eisenhower to have accepted the views of Lawrence and Teller on the clean bomb and the test ban. Strauss later confirmed that the Rabi and Teller–Lawrence groups had opposed each other “very sharply” ever since the H-bomb decision. What Strauss did not tell Eisenhower was the impact of the Oppenheimer case and the minority status of the Lawrence and Teller position within the scientific community. In his diary, Eisenhower noted, with surprise, that “Dr. Rabi and some of his group are so antagonistic to Drs. Lawrence and Teller that communication between them is practically nil.” Given his own turn toward arms control and his growing antipathy to Teller’s advocacy for continued nuclear buildup, it was clear which scientific group was going to gain his trust.⁵⁰ Thus, even though the Rabi initiative proved technically problematic, it did add to the voice for a test ban and, more important, let Eisenhower know that he could rely on the Rabi and Killian group for assistance on arms control.⁵¹

Science in National Security

As the White House sought to respond to the Sputnik crisis with reforms in science advising, the urgency of the situation was underlined by the delivery, on November

4, of the Gaither report, with its gloomy assessment of the Soviet military threat to the United States. Among its recommendations was a proposal for a massive program to defend the population and the nuclear force against a Soviet attack. In contrast to his largely positive reception of the TCP report three years before, Eisenhower reacted to the Gaither report with serious misgivings. Although agreeing on the need to protect the bombers, he thought the panel underestimated the U.S. offensive strength, especially the value of its many overseas bases. He concurred with the panel on giving priority to offensive power but doubted the feasibility of the shelter program.

Above all, Eisenhower's reservations about the Gaither report derived from his own profound rethinking of the direction of the arms race. Listening to the briefing by the Gaither panel, he was flabbergasted by its finding that in a nuclear war, the Soviet Union could inflict 50 percent casualties on the United States, and vice versa.⁵² It reinforced his conviction about the absurdity of talking about winning a nuclear war. "You can't have that war," he said. "There aren't enough bulldozers to scrape the bodies off of the streets."⁵³ When Eisenhower conveyed his conviction forcefully to the Gaither panel, he helped convert several young scientists, such as Jerome Wiesner of MIT and Herbert York of the AEC's Livermore Laboratory, who already began to question the direction of the arms race during the study, to the cause of arms control.⁵⁴

In the meeting with the Gaither panel, Eisenhower also lamented the tendency "in our democracies" to await a crisis such as Sputnik to awaken the people about the importance of science and technology. Instead of this "government by crisis," he wanted to "keep up interest and support without hysteria." However, hysteria was just what Eisenhower faced when the Gaither report was, to Eisenhower's dismay, leaked to the press in late November 1957. Part of the uproar came from Congress, which demanded public release of the report, but Eisenhower refused, claiming executive privilege. Although the administration eventually took the Gaither report into consideration in making the FY 1959 DOD budget, the apprehension it generated lingered on.⁵⁵

Finally, having undertaken all these steps, Eisenhower was ready to launch a series of "confidence speeches" to calm the country in the shadow of both Sputnik and the Gaither report. The first one was a radio and television address on November 7, 1957 on "science in national security" from the White House. Its drafting was in part shaped by a report from the ODM-SAC on the need to improve public appreciation of science, strengthen the partnership between science and the federal government, increase support for basic research, especially in the DOD, and reform science education.⁵⁶ In his speech Eisenhower emphasized how scientific advice and research had in the past shaped the superior American defense strength, complete with an enumeration of the many nuclear weapon and missile systems. Conceding Soviet advantages in satellites and in some other areas, Eisenhower nevertheless declared to the nation that the West still enjoyed overall military strength over the Soviet bloc. "Our scientists assure me that we are well ahead of the Soviets in the nuclear field, both in quantity and in quality."

In this address, Eisenhower spotlighted science not only as the driving force in the defense of America, but also as a key to the nation's future security and prosperity. Following Land's proposal, Eisenhower took the forum to promote public interest in science. "According to my scientific friends," he warned the millions of households watching him on TV and listening to him on radio, "we could fall behind" the Soviet Union if complacency persisted. He urged Americans to give higher priority to science education and basic research.⁵⁷ Moderate scientists' interpretation of the Sputnik challenge now reached the public through Eisenhower's pulpit.

It was in this speech that Eisenhower announced the appointment of Killian as his special assistant for science and technology. His job would be to formalize the science advising process, link government with the scientific community, and monitor the defense R&D programs. In particular, Eisenhower emphasized that Killian would help the secretary of defense to curb interservice rivalry in missile development. To facilitate scientific cooperation with the Western alliance, Eisenhower also proposed a NATO Science Committee, a science adviser to the secretary of state, and science attachés in important U.S. embassies abroad. In closing, Eisenhower mentioned the peaceful contributions of science—"there is much more to science than its function in strengthening our defense"—and called on the Soviet Union to join the U.S. in disarmament efforts.⁵⁸

A week later, in another speech on national security, Eisenhower expanded on the importance of science education and basic research: "My scientific advisers place this problem [science education] above all other immediate tasks of producing missiles, of developing new techniques in the Armed Services."⁵⁹ It was another powerful indication of the effectiveness of American public scientists' campaign to turn Sputnik into a challenge more in science and education than in military technology. At the same time, by highlighting the importance of science and education to national security, the speech also subtly accelerated their integration into the Cold War.

The upgrading of the ODM-SAC into the PSAC in the White House proceeded soon after the Killian appointment. In his November 7, 1957 speech, Eisenhower had said that Killian, as his science adviser, would be aided by a scientific staff and "a strong advisory group of outstanding experts reporting to him and to me." Notably, Eisenhower did not mention the ODM-SAC by name, probably because the White House had not yet decided whether to upgrade the ODM-SAC or establish a smaller advisory council modeled after the Council of Economic Advisers, which consisted of three economists working full time in the Executive Office of the president, with the chairman acting as the president's principal economic adviser. On November 15, Killian wrote Eisenhower that "after careful consideration," he recommended the upgrading of ODM-SAC. He also suggested the addition of several new members to strengthen the committee. Eisenhower approved the plan and announced the reconstitution and upgrading of the ODM-SAC into the PSAC on November 22, 1957.⁶⁰ As an indication of their newly acquired status, the science adviser and PSAC were given the best suite in

the Executive Building next to the White House as well as the privilege of using the White House mess for lunch, overcoming a long-standing inconvenience facing the old ODM-SAC.⁶¹

In a formal December 2, 1957 letter to Killian that served as the legal foundation for his office, President Eisenhower gave the science adviser what Killian later called “remarkable *carte blanche*.”⁶² He was asked to keep himself informed of science in government, giving primary attention to “the use of science and technology in relation to national security,” to provide the president with scientific and technological “facts, evaluations and recommendations,” to try to “anticipate future trends or developments” in science and technology, especially related to national security, and to facilitate international scientific exchanges with allies. Perhaps most important, the science adviser was authorized to attend the NSC and cabinet meetings and “to have access to all plans, programs, and activities involving science and technology in the Government, including the Department of Defense, AEC, and CIA,” reflecting a striking confidence from Eisenhower in his new science adviser.⁶³

Notably, the letter emphasized science in policy much more than policy for science; the latter was implied only when Killian was asked to work closely with the NSF and its director. It was more specifically spelled out in a separate set of terms of reference: “to be concerned with maintaining good and close relations with the U.S. scientific and engineering community and to further in every appropriate way the strength and morale of the scientific community.” The terms for PSAC likewise emphasized science in policy: it should be “broadly representative of those fields of science and technology most important to Government and at this juncture, most relevant to national security.” Both the letter and terms of references were, however, so generally worded that they contained the flexibility for the science advisory system to expand into areas beyond national security in science in policy and into policy for science even under Eisenhower.⁶⁴

The emphasis on science in policy was also reflected in the background of the five new PSAC members. Their fields of expertise indicated the primary importance of space and missiles as well as the possibility of a move by Eisenhower in the direction of a nuclear test ban. Chemist George B. Kistiakowsky of Harvard had worked on implosion at wartime Los Alamos and had sat on the influential John von Neumann committee on missiles. Physicist Herbert F. York, director of the AEC’s Livermore Laboratory and another alumnus of the von Neumann committee, was obviously knowledgeable about nuclear weapons. Both he and another new PSAC member, Robert F. Bacher, professor of physics at Cal Tech and a former AEC commissioner and ODM-SAC member, would play a key role in PSAC deliberations on a nuclear test ban. James Doolittle, then vice president of Shell Oil Company and chairman of both the Air Force Scientific Advisory Board and the National Advisory Committee on Aeronautics, would naturally advise on both the space and missile programs. Finally, Edward M. Purcell of Harvard, a Nobel laureate in physics and expert on space communication, would chair PSAC’s space science panel.⁶⁵

In many ways, the reconstituted and enlarged PSAC thus embodied the American scientific establishment. Not surprisingly, most members were veterans of wartime research under OSRD. However, contrary to common perceptions, the number of former atomic bomb makers (Bacher, Bethe, Kistiakowsky, and York) was dwarfed by that of the radar people (Killian, William O. Baker of Bell Labs, Berkner, Bronk, Fisk, Caryl P. Haskins of the Carnegie Institution of Washington, Purcell, Rabi, H. P. Robertson of Cal Tech, Wiesner, and Zacharias), although it should be noted that several members had worked on both. Continuing the ODM-SAC tradition, the membership fell into roughly three major categories: scientific generalists, industry, and medicine and biological sciences. All major forms of scientific institutions found representations: about half of the members came from academia (Killian, Bacher, Bethe, Bronk, Kistiakowsky, Purcell, Rabi, Robertson, Wiesner, and Zacharias), several were based in industry (Baker, Doolittle, Fisk, and Land), one (York) directed a government weapons laboratory managed by a university, one (Berkner) headed a university consortium on contract with the government, and three (Haskins, Bronk, and Paul Weiss of Rockefeller Institute, who was added in March 1958) operated from private research institutions. Interestingly, the last three also stood out from their physical scientist colleagues for being biologists or physiologists. With this mainly academic cast, it was not surprising that committee meetings often resembled more the freewheeling laboratory or departmental gatherings in the universities than formal bureaucratic affairs.

In addition to these full members, PSAC also invited several major science administrators, such as the NSF director, director of the National Institutes of Health, and, later, the director of defense research and engineering (DDRE) in the DOD (York became the first DDRE in 1958), to sit in on its meetings as consultants. Almost in a class by himself was Emanuel Piore, who, first as chief scientist of the Office of Naval Research and then as director of research at IBM (a position that Killian helped secure for him), had long been active in ODM-SAC affairs as a consultant.⁶⁶ In the wake of Sputnik he became the main troubleshooter for Killian despite the fact that he would not be made a full member of PSAC until 1959. He was, as he saw it, simply an insider:

When Killian took the job, he made it a condition that either Jim Fisk or I would back him up. One of us had to be in residence in Washington. Eventually, I became an official member of the committee, but it was almost irrelevant whether I was a member or not. I was part of the inner circle of the committee from the beginning, welcomed to every meeting.⁶⁷

In the future, when their terms expired, almost all the chairmen and a few key members, such as Bronk, Fisk, Land, Piore, Harvey Brooks of Harvard, and Colin MacLeod of New York University, would become consultants-at-large and participate in nearly all of the committee's activities. In the 1960s, these PSAC alumni consultants would play as important a role in the politics of science as current members.⁶⁸

Inevitably, who sat on the PSAC affected what came out of it. Members were more likely to be science administrators than working scientists—department chairs,

college deans, laboratory directors, and university presidents. As historian Rebecca Lowen has illustrated with the case of Stanford University, the interest of science administrators did not always coincide with that of the working scientists.⁶⁹ Among PSAC's science administrators, layers of networks overlapped: scientific (physicists, e.g., had already formed bonds in their field), institutional (several worked for the same universities or industrial labs), and political (PSAC members would often support the same candidates). "A Cambridge mafia" dominated PSAC, as a large number of MIT and Harvard faculty and alumni served as committee and panel members, a fact that often subtly colored their science policy advice to favor elite universities. As MIT president, Killian enjoyed especially the respect and loyalty of industrial scientists, such as Land, Fisk, Baker, and Piore, who had played a key role in his TCP investigation and would be most active in the early PSAC. These close connections among PSAC members might have helped make the committee into what Kistiakowsky called a "coherent, thinking organism," but it also gave them the appearance of an "old boys' club," in both a symbolic and a literal sense.⁷⁰ The committee remained an all-male cast throughout its existence. Some members of its secretarial staff were women, but their critical role in educating the scientists about the inner workings of the White House and Washington has often been neglected.⁷¹ Neither was there much racial or ethnic diversity in the committee, except for the presence of a number of Jewish American and immigrant scientists.⁷²

Remarkably, the establishment of the new science advisory system involved only the president, his close aides, and a few prominent scientists, without meaningful participation of the scientific community at large or the public. Neither did the BOB, which had been largely responsible for the creation of the ODM-SAC in 1950–1951, and Congress, which last spoke on science policy with the NSF Act, play any significant part. Like the NAS, PSAC was a semipublic institution whose establishment derived as much from American public scientists' desire to promote basic research and expand the role of scientists in the federal government as from the latter's need for assistance.⁷³ Interestingly, it operated on largely a nonpartisan basis; many of its members were Democrats but Eisenhower refused to intervene even when pressured by other members of his party.⁷⁴

The new PSAC convened on the same day as the White House announcement, at which time Rabi resigned the chairmanship (but remained a member) and Killian was elected to succeed him.⁷⁵ Although PSAC retained the option of electing a chairman other than the science adviser, the Rabi–Killian transition set a precedent that would be followed in the future to help maintain unity. At the committee's meeting in early January 1958, members elected Fisk and Bacher as co-vice chairmen.⁷⁶ With a sense of urgency, most PSAC members devoted substantial time to the committee's work; York and Kistiakowsky even worked full time on the all-important satellite and missile reports for several months. Killian quickly appointed panels in PSAC to provide advice for Eisenhower regarding space, missiles, a nuclear test ban, and, significantly, science policy. Usually chaired by PSAC members, these (and other) PSAC panels drew their members mostly from outside the committee, thus enabling PSAC to utilize a network of several

hundred scientists and engineers who were experts in their fields. In contrast to the massive and semiautonomous Killian TCP and Gaither panels of the ODM-SAC, the PSAC panels were often low-key operations focusing on specific issues. Early on, PSAC recognized the problem that its panels, as groups of specialists, could become parochial advocates for a certain policy, or, in the case of policy for science, could become advocates for their own respective fields. One way to counter such tendencies was to balance panel membership with people holding different points of view. Another way was to put specialist panel reports and recommendations through a thorough scrutiny by the full PSAC, which, as a gathering of generalists of stature and independence, could bring a broader perspective to the discussion. Thus PSAC created a two-tier system to achieve a kind of functional, collective objectivity not through cognitive purity or a priori elimination of bias, but as the result of a reasoned, balanced clash of ideas and interests.⁷⁷

The new science advisory system received enthusiastic support from the scientific community as well as from the public.⁷⁸ Many regarded it as one of the most significant steps Eisenhower undertook in response to the Sputnik crisis. It marked a new level of centralization of science in the federal government, never before achieved except during wartime, and had far-reaching implications for American defense and science policy. Although the NSF worried, again, that the new science advisers in the White House would further erode its statutory role in science policymaking, it nevertheless supported the move as giving scientists more control over military R&D.⁷⁹ A few scientists, most notably Wallace Brode, a veteran government scientist and president-elect of the American Association for the Advancement of Science, privately lamented the fact that Killian was not a trained scientist, but most scientists found Killian a wise choice for the post of science adviser.⁸⁰

Conclusion

Thus, only weeks after the onset of the Sputnik crisis, a new, vigorous presidential science advising system was in place. For Eisenhower, having his own scientists meant a better understanding and control of government programs that increasingly involved technical considerations. In public relations, they provided a shield to deflect political criticism, to slow down the space race, and to move toward nuclear arms control. They also helped the White House to resist what it regarded as undesirable reform proposals, such as an expansion of the NSC or the establishment of a Department of Science.⁸¹ Although the leak of the Gaither report showed the hazards of an outside group—never again would Eisenhower approve such an autonomous task force—the science adviser–PSAC arrangement proved an effective and valuable asset to the White House.⁸² As Gordon Gray, Eisenhower’s last national security adviser, later pointed out, “the reconstitution and elevation of the Science Advisory Committee in 1957 . . . had substantially eliminated the use of consultant groups which had been put together in the past such as the Technological Capabilities Panel, the Gaither Committee, etc.”⁸³

Clearly, public pressure, political expediency, and policy considerations prompted Eisenhower to create the presidential science advisory system. But

could he have chosen a different science adviser and brought in a different group of scientists than PSAC? Could he, for example, have appointed Edward Teller or Ernest Lawrence, who had just three months before Sputnik met with Eisenhower to lobby for the “clean bomb” and to argue against a test ban? Teller, in fact, was so ubiquitous in the media in the aftermath of Sputnik’s launch, including appearances on the cover of *Time* and on Edward Murrow’s *See It Now* television program, that David Lilienthal noted in his diary that “Teller’s is now the featured face (instead of Oppenheimer’s) in the role of scientific statesman.”⁸⁴ Or could Eisenhower picked Wernher von Braun, the rocket scientist whom the Army had brought from Germany at the end of World War II and who was widely celebrated as a space enthusiast and expert?⁸⁵ The fact that Eisenhower chose Killian and the ODM-SAC indicated his agreement with the latter in the intense debate and negotiation over the meaning of Sputnik: it represented less a military and technological threat than one in science and education. Furthermore, his awareness of the Rabi–Teller division over a nuclear test ban also confirmed his desire to bring in scientists who could advance his own efforts to control, not accelerate, the nuclear arms race. In other words, he was as much attracted by PSAC’s technological skepticism as he was repulsed by Teller and Lawrence’s technological enthusiasm.

Thus, a hope of using PSAC to raise the voice of moderation helped overcome Eisenhower’s considerable worry about the expanding role of scientists in public policy. In contrast to his complaint in July 1957 about “scientists . . . running the government,” he openly welcomed Killian and PSAC to “provide him with a scientific point of view” in policy matters.⁸⁶ His wariness about scientists’ policy role in general did not completely disappear; it would resurface in his warning against the scientific-technological elite in his farewell speech. However, Eisenhower appreciated PSAC scientists’ technological skepticism enough that he encouraged them to play an active role in public policy, including space, military technology, arms control, and science policy. In contrast, he grew disenchanted with the Teller–Lawrence group. Three days after he reconstituted PSAC, Eisenhower complained to Strauss bitterly about Teller’s Pearl Harbor analogy, commenting wryly that “Scientists have suddenly become military and political experts” and vice versa.⁸⁷

For American public scientists, the establishment of a presidential science adviser and PSAC marked the achievement of a long-sought goal. From the Steelman and Stewart reports of the 1940s, to the Golden plan of 1950, and through the ODM-SAC’s Princeton memorandum of 1952 and various other attempts of the committee during the Eisenhower administration, scientists had agitated for an institutional base at the top of the U.S. government. With the PSAC system, they finally regained a voice for science in national policymaking. Because of the nature of the Sputnik crisis, it was clear from the beginning that the new science advisers would play a key role in both science in policy and policy for science. How they approached and balanced their dual, and sometimes conflicting, mandates would help determine not only the fate of science advice at the top of the government, but also the science–state partnership for the remainder of the Eisenhower administration and beyond.