

Eisenhower, scientists, and *Sputnik*

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The Soviet launch of *Sputnik* shook the confidence of Americans in the country's defense and in its science. President Eisenhower convened a meeting of scientists in the Oval Office that Hans Bethe called an "unforgettable hour."

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On the evening of 4 October 1957, a Soviet SS-6 rocket lifted off from the Tyuratam range in Kazakhstan and placed a beachball-sized sphere weighing 84 kilograms into Earth orbit. It was *Sputnik*, the first artificial satellite. At a mean altitude of about 600 kilometers, *Sputnik* orbited Earth every 96 minutes. That momentous event opened a new chapter in the relationship between scientists and government in the US.

Judged by the influence scientists would have at the highest levels of government, it was a short chapter. From 1957 until the end of President Dwight D. Eisenhower's term in January 1961, scientists had direct access to him, and he actively sought their advice. As a result, scientific considerations influenced Eisenhower's policy decisions. It can be argued that never before or since have scientists had a firmer influence on the reins of power that direct national policies.

Over the past 100 years, scientists have been called upon to assist military leaders for the purpose of creating, developing, and improving weapons systems. That was certainly the case during World War I. In June 1916, at the request of President Woodrow Wilson, the National Research Council was formed "to encourage both pure and applied research for the ultimate end of the national security and welfare." Soon physicists were engaged in research directed toward, for example, the detection of German submarines. Other research efforts followed and paid dividends to the military. Military leaders, however, did not regard physicists with any affection. In his 1949 book *Modern Arms and Free Men*, Vannevar Bush wrote:

Military laboratories [prior to World War II] were dominated by officers who made it utterly clear that the scientists and engineers employed in these laboratories were of a lower caste of society. . . . [The] senior officers of military services everywhere did not have a ghost of an idea concerning the effects of science on the evolution of techniques and weapons.

With the discovery of nuclear fission in 1938, a discovery made in Germany, physicists quickly recognized that weapons of unprecedented destructive power were, in principle, possible. With enormous respect for the capabilities of their colleagues still in Germany, physicists in the US brought

the military potential of nuclear fission to the attention of President Franklin D. Roosevelt. The president did not know whether nuclear fission could be harnessed for military purposes. He had no idea how to exploit the discovery of nuclear fission, nor did the members of his inner circle. No one in the government or the military could even imagine how to capitalize on this discovery.



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I. I. Rabi (1898–1988) was chairman of the Science Advisory Committee at the time of the *Sputnik* launch in 1957.

Having brought nuclear fission to the president's attention, physicists were asked to make the American response. In September 1942 the Manhattan Project was established, and in early 1943 physicists began arriving in Los Alamos. The atomic bomb, designed and built in less than three years, brought an end to World War II. The bomb was a resounding testimony to the practical abilities of physicists.

Everyone knew that the atomic bomb ended the war. Many would say that the radar systems developed at MIT actually won the war. Both the bomb and radar were the handiwork of physicists. After World War II, physicists were celebrities. The nuclear era had begun, and it was the physicists who understood the nucleus. More than others, physicists felt in their bones the implications of the new age and the potential of nuclear energy for both war and peace. Because they understood the atomic nucleus, their skills were eagerly sought by the military. But policymakers ignored them.

J. Robert Oppenheimer, the most influential physicist at the war's end, visited President Harry S. Truman on 15 October 1945. The meeting was disastrous. Oppenheimer used the occasion to confess his guilt over his role in developing the devastating nuclear weapon. When Oppenheimer left the president's office, Truman told Dean Acheson, "I don't want to see that son of a bitch in this office ever again."¹

Oppenheimer said things to Truman that went far beyond the merely ill-advised; he said stupid things. And Truman had every reason to be angry. It was he, not Oppenheimer, who had ordered the destruction of Hiroshima and Nagasaki. However, the US had now entered a new era, and Truman had the responsibility to make informed judgments. He ignored Oppenheimer in spite of his universally acclaimed brilliance. He ignored Oppenheimer in spite of his expertise in nuclear matters. In spite of Oppenheimer's influence among scientists and the general public, he was of no importance to Truman. The president ignored not only Oppenheimer but physicists in general.

The Russian bomb

The Soviet scientists' pursuit of a nuclear bomb demonstrated the advantages of having access to political leaders. They detonated their first atomic bomb in August 1949. That came as a surprise to both civilian and military leaders in the US, but not to the scientists, who had repeatedly predicted that the Russians would have the bomb within five years after the Trinity test. "The Soviets," recalled I. I. Rabi in 1986, "were better positioned to approach top management than we were. Soviet scientists made direct approaches to Stalin. No one here had access to Roosevelt or Truman."²

Rabi's reminiscences were accurate. Even at that critical juncture, Truman ignored the scientists. It was financier Lewis Strauss, a commissioner of the Atomic Energy Commission, not Truman, who convened the AEC's General Advisory Committee (GAC), headed by Oppenheimer (see box 1), to consider the US response to the USSR nuclear success. If there was ever a time when a president would have benefited from a dialog with scientists who were knowledgeable about the American and Russian nuclear programs, it was in the fall of 1949.

In the US the immediate response to the Soviet success was the push to develop the fusion bomb. Once again, as Truman considered whether or not to develop that weapon, a weapon of almost unlimited destructive power, he side-stepped the physicists. He asked no questions of scientists, and he ignored the unanimous recommendation of the GAC, which strongly advised against its development. Truman lis-

Box 1. General Advisory Committee to the US Atomic Energy Commission, formed in 1946.

J. Robert Oppenheimer (chairman),
director, Institute for Advanced Study
James B. Conant, president, Harvard University
Lee DuBridge, president, Caltech
Enrico Fermi, physicist
I. I. Rabi, physicist
Hartley Rowe, engineer
Glenn Seaborg, chemist
Cyril S. Smith, metallurgist
Hood Worthington, chemist

tened to one set of voices—those eager to build the hydrogen bomb. Truman and other policymakers would have benefited from a meeting with those who understood what the factor 1 000 000 meant when applied to the destructive power inherent in a fusion weapon.

But the meeting was not to be. On 10 January 1950, Truman announced his decision by directing the Atomic Energy Commission to expand its work on nuclear weapons by initiating the development of the hydrogen bomb. "I never forgave Truman for buckling under pressure," said Rabi. "He simply did not understand what it was all about. . . . He didn't have his scientific people to consult and give him an impartial picture."³

During the years following World War II, the voice of scientists, even in an advisory capacity, was essentially muted. In August 1948 Vannevar Bush sought a means to mobilize science in the event of another national emergency. Of course, things move slowly in Washington; existing agencies oppose any changes that might intrude on their influence and dilute their power. Nonetheless, in April 1951, in the wake of Truman's decision to start the fusion-bomb project, the president announced the formation of the Science Advisory Committee to be housed in the Office of Defense Mobilization. But he never sought any advice from the SAC, and its members came close to resigning en masse. However, with the US fighting a war in Korea and Truman's term coming to an end, the SAC members decided to wait and see whether President-elect Eisenhower would make any better use of them. Eventually, their decision proved to be a wise one.

Eisenhower took office in January 1953. As the years passed, the members of the SAC had little reason to be encouraged. Basic research, the foundation on which the successes of World War II were based, was losing support. Early in 1957, Charles E. Wilson, the US secretary of defense, famously said, "Basic research is when you don't know what you're doing," and he cut support for it by 10%. At about the same time, the US Air Force and Navy were preparing to cancel 600 research projects. Rabi was concerned. He took his case to the White House, where he received a sympathetic response from Eisenhower, but no more.

Then came *Sputnik*

It was the 84-kg satellite that, for a brief period, launched scientists into Washington's corridors of power and provided them with the opportunity to influence policy decisions. As Daniel Greenberg wrote in 1968:

Until 1957 . . . there was no demand from the political side for science to maintain a vigorous, continuing presence in Washington. . . . But, of perhaps greater significance, there was virtually



President's Science Advisory Committee (PSAC) meeting with President Eisenhower on 19 December 1960. Standing (left to right) are George Beadle, Donald Honig, Jerome Wiesner, Walter Zinn, Harvey Brooks, Alvin Weinberg, Glenn Seaborg (behind Weinberg), David Beckler, Emanuel Piore, John Tukey, Wolfgang Panofsky, John Bardeen, Detlev Bronk, and Robert Loeb. Seated (left to right) are James Fisk, George Kistiakowsky, Eisenhower, James Killian, and I. I. Rabi. (Photo courtesy of AIP Emilio Segrè Visual Archives.)

no initiative on the part of scientific leadership to establish a clearly identified place for science in the policy-making councils. . . . In October 1957, the Soviets orbited *Sputnik*, and honeymoon fervor immediately returned to the romance between science and government.⁴

The romance between science and government was aided by the romance between I. I. Rabi and Dwight David Eisenhower. Eisenhower was no Truman and Rabi was no Oppenheimer. The two men first met when Eisenhower became president of Columbia University soon after the war. When introduced to Rabi, Eisenhower said, "I am always very happy to see one of the employees of the university," to which Rabi replied, "Mr. President, the faculty are not the employees of the university. They are the university."³ Eisenhower was impressed with Rabi's spunk, and they became fast friends.

The American people were deeply disturbed by *Sputnik*. Many concluded that the Russians now controlled the skies. Walter Reuther, a prominent labor leader, called the Russian achievement "a bloodless Pearl Harbor." Edward Teller went further. On television he said, "The United States has lost a battle more important and greater than Pearl Harbor."² A few months before *Sputnik*, Nikita Khrushchev had delivered his notorious "we will bury you" speech, and the Cold War had grown hotter. James Killian, who was to become Eisenhower's science adviser, has described the public reaction to *Sputnik* as a "wind-blown forest fire."⁵ People wondered whether the conduct of science in an authoritarian society like the Soviet Union had advantages over science carried out in a free country.

Eisenhower was not one to exhibit his inner feelings. His calm external demeanor prompted Americans to wonder if the president really understood *Sputnik's* significance. The pressure on him increased as advice came from all directions.

He understood, as did others, that it was not *Sputnik* itself that was important, but rather what *Sputnik* implied. Launching an 84-kg object into orbit meant that the Soviet SS-6 was a mighty rocket capable of launching weapons into Western Europe and perhaps beyond.

Two months after *Sputnik*, the US attempted to launch a 2-kg object with a Vanguard rocket. The rocket exploded on the launch pad. Eisenhower was in an awkward position. He knew more than he could tell. He knew, on the one hand, that the US satellite program was a part of the International Geophysical Year and was open for all to see. The US ballistic missile program, on the other hand, was run separately from the satellite program and was secret. Eisenhower knew that these two programs could have been merged and, as a result, the US could have launched a satellite earlier than *Sputnik*. But the president's knowledge was not public knowledge.

In the meantime, US intelligence agencies and the military were saying—or leaking—dire things; they greatly exaggerated the Soviet threat. The SAC's Gaither Report, based on US intelligence and presented to the president just one month after *Sputnik*, concluded that the USSR could blow the US apart. Because Eisenhower knew that the intelligence was flawed, he downplayed the significance of *Sputnik* and of the so-called missile gap, which he realized was just a scare tactic. "God help this nation," said Eisenhower, "when it has a President who doesn't know as much about the military as I do."²

Later Khrushchev wrote in his 1970 memoirs that at the time of *Sputnik*, "we lagged significantly behind the US in both warheads and missiles. . . . America was beyond reach."⁶ In 1957, as in more recent times, the US intelligence agencies claimed more for US adversaries than the adversaries claimed for themselves.

As *Sputnik* orbited overhead, the pressure was building on Eisenhower to take action. The pejorative term "missile gap" was gaining currency, and each military service

was vying strenuously for its own missile program. Eisenhower needed to act, but he needed information. "It was logical that Eisenhower should turn to the scientists as an organized profession. . . . They proffered their advice; they seemed less tainted by particular interests and constituencies; they offered reassurance to the public; and they were seen as possessing a technical expertise that could recommend efficient and correct solutions,"⁷ recalled chemist George Kistiakowsky, who followed Killian as the president's science adviser.

Eisenhower called for a meeting of the SAC. It was a distinguished group, with Rabi as its chairman. On 15 October 1957, the scientists met with the president. With him were two aides, Generals Robert Cutler and Andrew Goodpaster. The members of the SAC attending the meeting are listed in box 2.

The meeting was unusual. Goodpaster, Eisenhower's long-time attaché, took the minutes. The president opened the meeting by stating that he wanted to learn the committee members' state of mind and what they would propose. He asked if they thought American science was being outdistanced. Rabi answered that there were

some advantages on our part. However, the Soviets have picked up tremendous momentum, and unless we take vigorous action they could pass us swiftly just as in a period of twenty to thirty years we caught up with Europe and left Western Europe far behind.⁸

Rabi then asked Edwin Land to speak, and according to Goodpaster, he spoke "with great eloquence."

[Land] said that the country needs a great deal from science. But he felt that science, to provide this, needs the President acutely. The Soviets are now in a pioneering stage and frame of mind. They regard science both as an essential tool and a way of life. They are teaching their young people to enjoy science. Curiously, in the United

States we are not now great builders for the future but are rather stressing production in great quantities of things we have already achieved. . . . [Land] asked if there were not some way in which the President could inspire the country—setting out our youth particularly on a whole variety of scientific adventures.⁸

Eisenhower responded by saying he thought he could help. He said

he would like to try to create a spirit—an attitude toward science similar to that held toward various kinds of athletics. He [thought] that one speech would not do the job. There would be a need for great carry-through.⁸

Rabi continued by pointing out that many of the policy matters that come to the president have a strong scientific component, which set the stage for a specific proposal. Rabi urged the need for a presidential scientific adviser.

The President acknowledged that it might be good to have an adviser. Killian added that a committee to back up the adviser would have great value. The President agreed. Killian went on to suggest that research and development programs should be brought into focus. The need, Killian said, was leadership more than money.⁸

Direct access

In that October meeting, the groundwork was laid for a new White House position and for a new committee, both of which would have direct access to the president. On 7 November 1957, Killian became the first science adviser to the president, and the President's Science Advisory Committee (PSAC) was formed by 1 December 1957.

Eisenhower gave a speech on science and defense to the nation on 7 November 1957. In that speech, he drew from the discussions that occurred during the 15 October meeting, and he announced some of the decisions that sprang from it.

Hans Bethe described to me the 15 October meeting with Eisenhower:

One hour will always be in my mind, and that is the hour when we presented to President Eisenhower the need to have a stronger committee. And that is when we got the "P" in PSAC. It was a memorable hour. Rabi was our spokesman. . . . Rabi presented [the SAC] case to the president so concisely and convincingly, six major points in one hour, and Eisenhower immediately understood. This was an unforgettable hour, completely changed my opinion of President Eisenhower. I found that he was extremely quick, understanding almost immediately what we were after, and acted on it. He immediately turned to his adjutant, "You see that this is done."³

Sputnik opened new doors for the scientists. After finishing his service as secretary of defense in 1961, Thomas Gates said, "All of a sudden scientists became very important. . . . The world completely changed, in terms of military affairs. And foreign policy changed with it."⁷

One of the first policy-related issues that PSAC was asked to consider was the possibility of a treaty banning atmospheric nuclear tests. As early as mid-1955, Eisenhower

Box 2. The 15 October 1957 meeting between President Eisenhower and members of the Science Advisory Committee (SAC) listed here.

I. I. Rabi (chairman), Columbia University
 Lloyd V. Berkner, president, Associated Universities
 Hans A. Bethe, Cornell University
 Detlev W. Bronk, president, National Academy of Sciences
 David Z. Beckler, assistant to Bronk
 James B. Fisk, executive vice president, Bell Laboratories
 Caryl P. Haskins, president, Carnegie Institution of Washington
 Albert G. Hill, MIT
 James R. Killian Jr, president, MIT
 Edwin H. Land, president, Polaroid
 Herbert Scoville Jr, assistant director, CIA
 Alan T. Waterman, director, NSF
 Jerome B. Wiesner, MIT
 Jerrold R. Zacharias, MIT
 General Robert Cutler, aide to President Eisenhower
 General Andrew J. Goodpaster (meeting secretary), aide to President Eisenhower

James R. Killian Jr
(1904–1988) became
President Eisenhower's
first science adviser
shortly after the *Sputnik*
launch.



had broached the subject of a test ban with Strauss by asking why more bombs were needed. In June 1955 Eisenhower met with Strauss, Teller, and Ernest Lawrence. From those three, Eisenhower heard only opposition to a nuclear test ban. For example, Teller said that halting testing would be “a crime against humanity.”²

By 1957, however, a test-ban treaty had become a major goal of Eisenhower's, and he wanted to achieve that goal before the end of his presidency. Killian has noted that by “the end of 1957, and on into 1958, the pressures on the president to ban US testing were steadily mounting, both at home and abroad.”⁵ Radioactive fallout from testing had become a national issue, with the result that the Gaither Report “urged a program of building fallout shelters on an enormous scale.”² On 6 January 1958, Secretary of State John Foster Dulles reported to Eisenhower's National Security Council that the US was taking a battering at the United Nations over fallout from nuclear tests in the atmosphere.

While support for a cessation of atmospheric testing was mounting, the opposition to a test-ban treaty remained formidable. Strauss was fundamentally opposed to any thought of a test ban. He had been the architect of the 1954 Oppenheimer security hearings and had designed them to guarantee Oppenheimer's destruction. Now he was chairman of the Joint Committee on Atomic Energy. The Joint Chiefs of Staff also opposed the idea of a test ban. Influential scientists such as Teller and Lawrence spoke out against the ban.

Into the controversy stepped Killian and the members of PSAC. The scientists had an advantage. By early 1958 Eisenhower was influenced more by Killian and PSAC than by the nonscientist Strauss and the others who opposed the test ban. Killian, Rabi, and Bethe conveyed to Eisenhower their judgment that the nuclear weapons of the US were superior to those of the USSR and that a test ban would lock in that advantage.

Killian appointed a panel chaired by Bethe to study the

issue. The panel considered three questions: Could the US detect Soviet tests in the atmosphere? How did the nuclear strengths of the two countries compare? And what would a test ban do to the US weapons laboratories? Bethe's report went first to the National Security Council in March 1958. Then it was up to PSAC to evaluate the report on behalf of the president. With one dissenting vote, the PSAC members recommended, in principle, a cessation to nuclear tests. The committee proposed that discussions be held with the Soviet Union on monitoring systems.

Thwarted by the U2 incident

Kistiakowsky succeeded Killian in July 1959 as Eisenhower's science adviser and chairman of PSAC. Before Kistiakowsky was sworn into office, Eisenhower told him that the nuclear test ban was a priority. Unfortunately, the U2 spy-plane incident in May 1960 shifted attention away from the test-ban issue. As a result, Eisenhower failed to achieve his desired goal. The nuclear test ban was finally agreed to during President John F. Kennedy's administration.

During Eisenhower's second term, PSAC issued several important reports including *Deterrence and Survival in the Nuclear Age* (November 1957), *Introduction to Outer Space* (March 1958), *Strengthening American Science* (December 1958), *High Energy Accelerator Physics* (May 1959), *Education for the Age of Science* (May 1959), and *Scientific Progress, the Universities, and the Federal Government* (November 1960).

The *Sputnik*-spawned initiatives have, with noteworthy exceptions, survived to the present day. But survival and robust health are not equivalent. Under President Eisenhower, Kistiakowsky sustained the vitality, established by Killian, of science in the decision-making process. PSAC did exert an influence on policy decisions. To a somewhat lesser extent, the science advisory apparatus functioned under President Kennedy, who enjoyed a close relationship with his science

George B. Kistiakowsky (1900–1982) succeeded Killian as President Eisenhower's science adviser in 1959.

adviser Jerome Wiesner, an electrical engineer by training.

After Kennedy, however, the prominence of science advice in matters of national policy began to deteriorate. When individuals from the social sciences, the biomedical sciences, and industry became members, PSAC itself lost the coherence it once enjoyed. As David Beckler has written, the original PSAC had functioned "as an unusually effective team."⁹ But the more diversified PSAC came to be regarded as a collection of individual experts who gave specialized advice. That, in Beckler's view, was a far cry from a unified group that provided the scientific implications of policy issues to the president.

The breaking point came during the administration of Richard Nixon. Two controversial issues were the cause. The proposed anti-ballistic-missile system and the supersonic transport had the vigorous backing of the White House. PSAC raised serious questions about the military effectiveness of the ABM, and the chairman of PSAC publicly denounced the SST.

In early 1973, President Nixon abolished the entire science-advising apparatus.

In May 1976 the Office of Science and Technology Policy was established in the Executive Office of President Gerald Ford. Its chairman would serve as the president's science adviser. Through the presidencies of Jimmy Carter, Ronald Reagan, George H. W. Bush, Bill Clinton, and George W. Bush, the position of science adviser, while it continues to exist, has been largely isolated, if not muted.

It is certainly true, as Rabi said at the *Sputnik*-inspired meeting on 15 October 1957, that most "policy matters that come to the President have a strong scientific component." Therefore, scientific advice is more than merely useful; it is needed. But presidents are generally unfamiliar with science, unfamiliar with scientists, and ignorant of the culture of science. They have typically relegated their science advisers to the back room of another building down the street.

Eisenhower died on 28 March 1969. A few months before his death, Killian visited him at Walter Reed Hospital. The former president was surrounded by the instruments relevant to cardiac care, and his heartbeats were visible on an oscilloscope screen. During the conversation, he asked about "my scientists" and he mentioned several of them by name. Then he said

You know, Jim, this bunch of scientists was one of the few groups that I encountered in Washington who seemed to be there to help the country and not to help themselves.⁵

"That statement was true," wrote Killian in recalling this last conversation.⁵

The influence of scientists on matters of policy during



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the late 1950s was robust for at least two reasons. First, the scientists themselves were an unusual bunch of individuals. From their experiences during World War II, they had acquired some statesmanlike qualities. They recognized that they could make a vital contribution.

Even more important was Eisenhower's recognition of his need for their advice. He listened to the scientists and acted on their advice. Fortunately, Eisenhower was comfortable with "his scientists," and he liked them. Few presidents since have had the self-confidence to sit with an intimidating group of scientists and take advantage of their advice. Eisenhower had that self-confidence.

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