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Chapter 1

An Unintended Consequence of the IGY: Eisenhower, Sputnik, and the Founding of NASA*

Roger D. Launius†

Abstract

On 4 October 1957, the Soviet Union launched the first Earth-circling artificial satellite and the United States responded by taking numerous actions aimed at "remediating" a Cold War crisis. This included the establishment of a separate civilian space agency charged with the conduct of an official program of scientific and technological space exploration, consolidation of Department of Defense space activities, the passage of the National Defense Education Act, the creation of a Presidential Science Advisor, and a host of lesser actions. The politics of these changes is fascinating, and has been interpreted as an appropriate political response to a unique crisis situation. Interest groups, all for differing reasons, prodded national leaders to undertake large-scale efforts, something the president thought unnecessarily expensive and once set in place impossible to dismantle. But was the Sputnik crisis truly a crisis in any real sense? Was it made

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† Division of Space History, National Air and Space Museum, Smithsonian Institution, Washington, D.C., U.S.A.

into one by interest groups who used it for their own ends? This chapter will trace briefly some of the major themes associated with the International Geophysical Year (IGY) and Sputnik and describe the political construction of the crisis as it emerged in 1957–1958. It will also discuss something about the transformation of federal science and technology that took place in response to this "crisis" and how it set in train a series of processes and policies that did not unravel until the end of the Cold War.

Introduction

In an irony of the first magnitude, U.S. President Dwight D. Eisenhower believed that the creation of the National Aeronautics and Space Administration (NASA) was a mistake. Indeed, the farewell address of Eisenhower, on 17 January 1961, presented just as the 34th president departed the White House, is remembered today chiefly for his warning about the potency of the military–industrial complex, which he said had the "potential for the disastrous rise of misplaced power." What has been mostly forgotten is Eisenhower's equally strong warning about the "danger that public policy could itself become the captive by a scientific–technological elite." He cautioned that this scientific–technological elite was closely tied to the power of the military–industrial complex, indeed the technological revolution made possible by this elite largely fueled the sweeping changes in the industrial–military posture during and after World War II.[1]

Although other issues certainly helped to define Eisenhower's concerns about what he considered dangers to American institutions, the Sputnik crisis of 1957–1958 and the resultant creation of NASA, as well as many other initiatives undertaken within the federal government, certainly affected his perspectives on this subject in a fundamental way. A specific instance of this perception in his farewell address is Eisenhower's comment about the misplaced "temptation to feel that some spectacular and costly action could become the miraculous solution to all current difficulties." With proper deference to the importance of science and technology, Eisenhower suggested that the nation must avoid a rush to judgment in a crisis situation and refrain from establishing expensive new organizations and programs "as the only way to the road we wish to travel."[2]

To a very real extent, NASA's creation and initial modest space exploration agenda was the product of the interchange between Eisenhower's vision of limited government and a loosely defined set of interest groups that pressed for aggressive, but perhaps ill-considered, action in the immediate post-Sputnik era. In particular, this cadre of interests sought to create a powerful government bu-

reaucracy, perhaps even a cabinet-level department, to carry out a far-reaching and exceptionally expensive agenda in space. So successful were these groups in promoting their image of space exploration, that the Eisenhower administration had to compromise its limited agenda, and after President John F. Kennedy entered the White House in 1961 space advocates moved to increase the size, scope, and budget of NASA.

At sum, NASA was an unintended consequence of the Sputnik crisis. It came in no small part because of the failure of the Eisenhower administration to manage the crisis and reach outcomes more in line with his administration's conservative, limited government values. In the aftermath of the launches of *Sputnik 1* and *2*, and the failure of the Vanguard launch in December 1957, the president lost the initiative in this arena to political rivals who proceeded to respond aggressively with an activist spaceflight agenda that challenged the Soviet Union's early successes. Only because of that effort, emanating from beyond the Republican-dominated White House and Congress, did the United States recover a measure of its prestige vis à vis the Soviet Union. It represented another instance of a long string of failures of the Eisenhower administration in foreign policy.

The Sputnik Crisis Master Narrative

The story of the International Geophysical Year (IGY), Sputnik, and the creation of NASA are well-known elements of the larger story of the beginnings of the space age. The master narrative of this set of events has offered a significant lesson for those who are exposed to it. The master narrative of the Sputnik crisis rests on surprise, shock, and recovery. It represented a significant challenge to the United States that required great ingenuity and sacrifice to overcome, but in doing so the nation demonstrated its exceptionalism for all to see. Of course, a master narrative is best characterized as secure knowledge formed to delineate the trajectory of the historical event and center it in its appropriate cultural place. At a fundamental level, such a recitation became canonical over the past 50 years, with little variation over time.

Alex Roland captured the nature of this type of narrative best: it is a specific retelling of a specific story and in that retelling it performs a specific purpose. It is not so much history as it is "tribal rituals, meant to comfort the old and indoctrinate the young."[3] In this sense it is mythology that points up the highest ideals of the society. As James Oliver Robertson observes in *American Myth, American Reality*, "Myths are the patterns of behavior, or belief, and/or perception—which people have in common. Myths are not deliberately, or necessarily consciously, fictitious."[4]

Such myth is not so much a fable or falsehood, as it is a story, a kind of poetry, about events and situations that have great significance both for those involved and those who follow. Myths are, in fact, essential truths for the members of a cultural group who hold them, enact them, or perceive them. They are sometimes expressed in diffuse ideologies, but in literate societies, such as the United States, they are also embedded in historical narratives. Robertson's book is one of many studies that focus on American myths—such as the myth of the chosen people, the myth of a God-given destiny, and the myth of a New-World innocence or inherent virtue.[5] As scholars of space history are now beginning to recognize, versions of these myths have also been held by those who recollect the history of spaceflight, they in turn relate them to a range of experiences relating to the subject.[6]

Memory, myth, and history are closely akin to one another; essentially they are stories that explain how things got to be the way they are with a particular hue that allows lessons beyond the bare facts of the story to be drawn. But common parlance suggests that memory is often faulty, myth is fiction, and only history is, or at least aspires to be, true. History, however, is an attempt to recount, model, or reconstruct the memory of the past for the purposes of the present. For a variety of reasons, such attempts are never completely successful. Thus, it is important to distinguish between history—the recounting of past events—and the past that is truly lost forever. History never fully or completely or accurately describes the past, but attempts to develop approximate mental models or reconstructions of events. Different cultures at different times formulated and presented their reconstructions of the past in strikingly different ways. Thus, it is highly dangerous to attempt to evaluate the relationships among another culture's concept of "history," our own concept of "history," and the lost reality of the past. All themes overlap in some way, but none is a precise mirror image of the other. Many people confuse history with the unrecoverable past, and confuse myth and memory with fiction.[7]

This story begins with the rise of the U.S. space program in response to the pressures of national security during the Cold War with the Soviet Union.[8] From the latter 1940s the Department of Defense had pursued research in rocketry and upper atmospheric sciences as a means of assuring American leadership in science and technology and for the purposes of national security. This space effort received a huge boost in 1952 when the International Council of Scientific Unions established a committee to arrange the IGY for the period 1 July 1957 to 31 December 1958, with the inclusion of an orbital satellite objective as a part of the effort. After years of preparation, on 29 July 1955, the U.S. scientific community persuaded President Eisenhower to approve a plan to orbit a scientific satellite as

part of the IGY effort. With the launches of *Sputnik 1* and *2* by the Soviet Union in the fall of 1957 and the American orbiting of *Explorer 1* in January 1958, the space race commenced and did not abate until the end of the Cold War—although there were lulls in the competition.[9] The most visible part of this competition was the human spaceflight program—with the Moon landings by Apollo astronauts as de rigueur—but the effort also entailed robotic missions to several planets of the solar system, military and commercial satellite activities, and other scientific and technological labors.[10]

The Naval Research Laboratory's Project Vanguard was chosen, on 9 September 1955, to support the IGY effort, in part because it did not interfere with high-priority ballistic missile development programs—it used the non-ballistic missile Viking rocket as its basis—while an Army proposal to use the Redstone ballistic missile as the launch vehicle waited in the wings.[11] Project Vanguard enjoyed exceptional publicity throughout the second half of 1955 and all of 1956, but the technological demands on the program were too great and the funding levels too small to foster much success.

As the master narrative states, a full-scale crisis began on 4 October 1957, when the Soviet Union launched *Sputnik 1*, the world's first artificial satellite. It had a "Pearl Harbor" effect on American public opinion, creating an illusion of a technological gap and provided the impetus for increased spending for aerospace endeavors, technical and scientific educational programs, and the chartering of new federal agencies to manage air and space research and development.

Sputnik led directly to several critical efforts aimed at "catching up" to the Soviet Union's space achievements. Among these:

- A full-scale review of both the civil and military programs of the United States (scientific satellite efforts and ballistic missile development).
- Establishment of a Presidential Science Advisor in the White House, who had responsibility for overseeing the activities of the federal government in science and technology.
- Creation of the Advanced Research Projects Agency in the Department of Defense, and the consolidation of several space activities under centralized management.
- Establishment of National Aeronautics and Space Administration to manage civil space operations.
- Passage of the National Defense Education Act to provide federal funding for education in the scientific and technical disciplines.

More immediately, the United States launched its first Earth satellite on 31 January 1958, when *Explorer 1* documented the existence of radiation zones encircling Earth. Shaped by Earth's magnetic field, what came to be called the Van

Allen Radiation Belt partially dictates the electrical charges in the atmosphere and the solar radiation that reaches Earth. It also began a series of scientific missions to the Moon and planets in the latter 1950s and early1960s.[12]

Again, as codified in the master narrative, Congress passed, and President Dwight D. Eisenhower signed, the National Aeronautics and Space Act of 1958. This legislation established NASA, with a broad mandate to explore and use space for "peaceful purposes for the benefit of all mankind."[13] The core of NASA came from the earlier National Advisory Committee for Aeronautics (NACA) with its 8,000 employees, an annual budget of $100 million, and its research laboratories. It quickly incorporated other organizations into the new agency, notably the space science group of the Naval Research Laboratory in Maryland, the Jet Propulsion Laboratory managed by the California Institute of Technology for the Army, and the Army Ballistic Missile Agency in Alabama.[14]

The Soviet Union, while not creating a separate organization dedicated to space exploration, infused money into its various rocket design bureaus and scientific research institutions. The chief beneficiaries of Soviet spaceflight enthusiasm were the design bureau of Sergei P. Korolev (Chief Designer of the first Soviet rockets used for the Sputnik program) and the Soviet Academy of Sciences, which devised experiments and built the instruments that were launched into orbit. With huge investments in spaceflight technology urged by Soviet Premier Nikita Khrushchev, the Soviet Union accomplished one public relations coup after another against the United States during the late 1950s and early 1960s.[15]

In the United States, within a brief time after NASA's formal organization, the new agency also took over management of space exploration projects from other federal agencies and began to conduct space science missions—such as Project Ranger to send probes to the Moon, Project Echo to test the possibility of satellite communications, and Project Mercury to ascertain the possibilities of human spaceflight. It soon led to the rapid expansion of NASA and the mandate to reach the Moon by the end of the 1960s; a task successfully accomplished, thereby ensuring the positive conclusion of the story by reaffirming American capability.[16]

This is triumphalist history, emphasizing the exceptionalism that is America as it overcomes adversity. A longstanding element of the American character, most Americans have unquestioningly viewed their past as exceptionalistic and triumphant.[17] As historian Lawrence Langer astutely observed:

> The American mind in particular—by heritage, training, and instinct—is unsympathetic to any forecast whose dominant image is an obstacle instead of a vista. Our culture teaches us to demolish barriers or clamber over them; to us, the death sentence is not a statement of human limits, but a feint of nature to be outfoxed by medical or religious tactics. Writer Harold Brod-

> key, when he learned that he was the victim of the fatal AIDS virus, commented painfully on how little support he received from his native milieu. An American daydream, he said, was about "rebuilding after the flood, about being better off than before, about outwitting this or that challenger, up to and including death."[18]

Consequently, the master narrative of Sputnik revolves around an initial shock to the system and then a whirlwind of activity to recapture the initiative from the Soviet Union in the space realm. Ultimately, America is both justified and triumphant through the success of the Apollo program, and the master narrative is completed.

Sputnik and Its Aftermath

In October 1957 those who had been calling for aggressive action in space, although previously checked at many turns, found a willing audience in the White House. It came dramatically on the evening of 4 October, when word reached Washington that the Soviet Union had launched an orbital satellite as part of its contribution to the IGY. At the end of a long week of scientific meetings concerning the IGY taking place in Washington, DC, scientists gathered at the Soviet Union's embassy to celebrate their activities. It was the appropriate culmination of a week-long set of international scientific meetings. It was also, in the cynical Cold War world of international intrigue between the United States and the Soviet Union, an opportunity to gather national security intelligence and engage in petty games of one-upmanship between the rivals. This one would prove far different. The one-upmanship continued, but it was far from petty. To a remarkable degree, the Soviet announcement that evening changed the course of the Cold War.[19]

Dr. John P. Hagen arrived early at the party; he wanted to talk to a few Soviet scientists, those he considered personal friends from long years of association in international scientific organizations, to learn their true feelings about efforts to launch an artificial satellite as part of the IGY. Hagen, a senior scientist with the Naval Research Laboratory, headed the American effort to launch a satellite for the IGY, codenamed Project Vanguard, and it was behind schedule and over budget. Was the same true of the Soviet Union, or would its satellite go up in 1958 as planned?

Hagen had been through a wringer the last week. Beginning on Monday, 30 September, the international scientific organization known as Comité Spéciale de l'Année Géophysique Internationale (CSAGI) had opened a six-day conference at the National Academy of Sciences in Washington on rocket and satellite

research for the IGY. Scientists from the United States, the Soviet Union, and five other nations met to discuss their individual plans and to develop protocols for sharing scientific data and findings. Hints from the Soviet scientists at the meeting, however, threw the conference into a tizzy of speculation. Several Soviet officials had intimated that they could probably launch their scientific satellite within weeks, instead of months, as the public schedule said. Hagen worried that scientist Sergei M. Poloskov's offhand remark on the conference's first day that the Soviet Union was "on the eve of the first artificial earth satellite" was more than boastful, alliterative rhetoric. What would a surprise Soviet launch mean for his Vanguard program and for the United States, he wondered?

Hagen did not have long to wait to learn the answer to this question. The party had gathered in the second-floor ballroom at the embassy, when a little before 6:00 p.m. Walter Sullivan, a reporter with the *New York Times* who was also attending the reception, learned that the Soviet news agency TASS had just announced the launch of *Sputnik 1*, the world's first Earth-orbiting artificial satellite. He sought out Richard Porter, a member of the American IGY committee, and whispered, "it's up." Porter's ruddy face flushed even more as he heard this news, although he too suspected Sputnik's imminent launch, and he glided through the gaggles of scientists, politicians, journalists, straphangers, and spies in search of Lloyd Berkner, the official American delegate to CSAGI.

When told the news, Berkner acted with the characteristic charm of his polished demeanor. Clapping his hands for attention, he asked for silence." I wish to make an announcement," he declared. "I've just been informed by the *New York Times* that a Russian satellite is in orbit at an elevation of 900 kilometers. I wish to congratulate our Soviet colleagues on their achievement." On the other side of the ballroom, Hagen's face turned pale. They had beaten the Vanguard satellite effort into space. Were they really the greatest nation on Earth, as their leaders boisterously reminded anyone who would listen? Were they really going to bury us, as Soviet Premier Khrushchev announced at the United Nations as he pounded his fist and then his shoe on his desk? What could the United States do to recover a measure of international respect?

The inner turmoil that Hagen felt on "Sputnik Night," as 4–5 October has come to be called, came in part because he recognized that his efforts to launch a satellite, at least to be first, had failed. Some have taken his response to be the first instance of what some have referred to as "the shock of the century."[20] But that shock only slowly reverberated through the American public in the days that followed. Most Americans seemed to recognize that the satellite did not pose a threat to the United States and instead congratulations ensued, and many people seemed excited by the Soviet success. At the same time, Eisenhower acknowl-

edged the need to "take all feasible measures to accelerate missile and satellite programs."[21] He also moved to assure the American public that all was well, largely succeeding in doing so during the month of October 1958.

Instead, it seems that a generation of Americans embraced the dawn of the space age as a symbol of progress and a better future both on Earth and beyond. Raised on visions of human colonies on the Moon and Mars; great starships plying galactic oceans; and prospects of a bright, limitless future beyond a confining, overcrowded, and resource-depleted Earth (brought to the public by the likes of media magnate Walt Disney and German rocketeer Wernher von Braun); a generation of Americans embraced a promising future in space. Taught in the early 1950s that spaceflight loomed just on the cusp of reality, they now saw that perception come true. For one, it thrilled 14-year-old Homer Hickam as he watched "the bright little ball, moving majestically across the narrow star field between the ridge lines" of his home in Coalwood, West Virginia. It inspired him, and many like him, to devote their lives to the quest for space.[22]

In fact, the best evidence suggests that excitement about prospects for the future dominated the thinking of the American public immediately after the Sputnik launch. Three days after its launch, social anthropologists Margaret Mead and Rhoda Metraux began collecting data gauging American responses to Sputnik. They asked colleagues and friends around the country to conduct surveys, asking three open-ended questions among divergent age, gender, race, economic, and social groups of all:

1. What do you think about the satellite?
2. How do you explain Russia's [*sic*] getting their satellite up first?
3. What do you think we can do to make up for it?[23]

Mead and Metraux collected 2,991 adult responses until 18 October, and these responses suggest the need for a revision to the master narrative, because neither shock nor awe was present. An exceptionally small number said that the Soviet launch of Sputnik was an unexpected event; an even smaller number registered no knowledge of the launch. Of those who had little or no knowledge, the response of one 22-year-old white female from Austin, Texas, was characteristic: "It was a surprise to hear that the satellite was launched successfully... I was skeptical that such a project would ever materialize. Now that it has, it shows that science is still progressing." Another respondent, a 40-year-old white male from Louisville, Kentucky, said it this way: "It's been a scientific possibility for some time... Russia had said she would launch it, so it did not come as a surprise."[24] While few interviewees chose to call Sputnik a surprise, most knew little about the space efforts in either the United States or the Soviet Union. As one investigator summarized in a report on this study, "it seems that most informants in the

'Emergency Survey,' whether or not they possessed prior knowledge about artificial satellites, had taken the news of Sputnik in stride and developed a logical, rather than emotional, approach to the topic by the time they were interviewed."[25]

This assessment squares with more scientific study of the Sputnik response. As a government study reported in October 1958:

> Interpretations of the sputnik's significance likewise show that public concern was not great. Gallup found that only 50 percent of a sample taken in Washington and Chicago regarded the sputnik as a blow to our prestige. Sixty percent said that we, not the Russians, would make the next great "scientific" (actually technological) advance. A poll by the *Minneapolis Star and Tribune* found that 65 percent of a sample in that State thought we could send up a satellite within 30 days following the Russian success, a statistic which included 56 percent of the college-educated persons asked. In the sample of the Opinion Research Corporation, 13 percent believed that we had fallen behind dangerously, 36 percent that we were behind but would catch up, and 46 percent said that we were still at least abreast of Russia.[26]

There is good reason to believe that the response to Sputnik was politically constructed for specific electoral ends. George Reedy, a Democratic strategist, wrote to Lyndon B. Johnson (LBJ) on 17 October 1957 about how they could use the Sputnik issue to the party's advantage: "the issue is one which, if properly handled, would blast the Republicans out of the water, unify the Democratic Party, and elect you President." He suggested that "you should plan to plunge heavily into this one. As long as you stick to the facts and do not get partisan, you will not be out on any limb." Reedy added that to use such an issue to wrest power from the Republicans, LBJ and his caucus in Congress would need to establish the legitimacy, breadth, and dynamism of the Sputnik issue. He outlined ways in which that might be accomplished. In doing so, Reedy noted, the Democrats would seize the initiative and be successful in generating considerable public outcry:

> Nevertheless, as the facts sink home, the American people are bound to become increasingly uneasy. It is unpleasant to feel that there is something floating around in the air which the Russians can put up and we can't. The American people do not like to be "second-best." Furthermore, the various dope stories about the Sputnik mapping the ground with infrared rays and about the possibility of one flying overhead with a television camera are bound to have an effect. People will soon imagine some Russian sitting in the thing with a pair of binoculars and reading their mail over their shoulder. Folks will start getting together in the evening over a case of beer and some field glasses watching for Sputnik and ignoring television. And when two or three of the satellites get into the ionosphere, what is not now curiosity may turn into something close to panic.[27]

Using every tool at their disposal, LBJ and his associates worked to maximize the *Sputnik* launch for their political purposes. Speaking for many Americans, he remarked in two speeches in Texas in the fall of 1957 that the "Soviets have beaten us at our own game—daring, scientific advances in the atomic age." Because those Cold War rivals had already established a foothold in space, Johnson proposed to "take a long careful look" at why the U.S. space program was trailing that of the Soviet Union.[28] He led a broad review of American defense and space programs in the wake of the Sputnik crisis. Eventually, the public may have gotten very afraid of the ramifications of the satellite, but not immediately.

These observations are validated by the findings of representatives of the International Affairs Seminars of Washington who reported to Eisenhower about the publication reaction to Sputnik a year later:

> If there was any trauma following the Russian sputnik [*sic*], it occurred in Washington and not among the general public. Washington, for its part, took its cue from the newspapers and other issue makers. The misevaluation by leadership of the extent of public interest, as measured by the amount of news, coverage and the words of the issue makers, led to words and actions which further confused the issue. This situation points up the general problem for a democracy of: who is the "public" to which leadership attends and who in fact do the issue makers represent?[29]

Eisenhower as Sputnik Crisis Leader

Without question, in reacting to the Sputnik crisis, Eisenhower was pressed by a set of political exigencies to respond to the crisis. How well he did so requires reevaluation. Indeed, he lost the initiative in agenda setting and national leadership in the fall of 1957 and did not regain it, at least in terms of space policy, during the remainder of his term. For this failure Eisenhower's leadership as president deserves criticism. This brings to the fore the issue of Eisenhower revisionism that has been underway for the last 30 years and highlights its inadequacies. At a fundamental level this revisionism was built on the flimsiest of reasons: "Eight years of Eisenhower: seven and a half of peace. Ten years of Kennedy, Johnson, Nixon: almost ten solid years of war."[30]

In essence, Eisenhower gained stature as a president years after he left office because the bar was relatively low to start with. I agreed with many of Fred Greenstein's arguments about Eisenhower in *The Hidden-Hand Presidency*, that he was much more than his critics in the 1950s thought. I accept that he worked hard behind the scenes to provide a steadying influence on national strategy. But I am now much less satisfied with the Eisenhower revisionism than I used to be. Of course, Eisenhower has attained lofty status as some type of grand strategist

that seems overdrawn at this point. For example, with American prestige clearly at stake in the Cold War during the 1950s, it is puzzling that the chief executive should have been so reluctant to recognize this fact of life. Eisenhower totally mishandled a long list of international intrigues with the Soviet Union; completely misinterpreted the nationalist fervor of former European colonies; displayed alarming incapacity to understand anything happening in Latin America, Africa, and Asia; and the list goes on and on.[31]

So what might we make of Eisenhower's leadership in the Sputnik winter of 1957–1958? There are several important questions that beg discussion. Most important, how did he so miss the psychological importance of Sputnik for the American people? There are, of course, many other issues of a more sublime nature, but focusing on this question promises a few useful insights.

Failure to appreciate the prestige associated with spaceflight is seemingly unfathomable for an individual of Eisenhower's savvy, cagey, strategic nature. Both military and civilian observers had been discussing it for more than a decade. Under the Department of Defense and its predecessor, a series of important studies on the use of space systems for national security and other purposes pointed this up quite well. Perhaps the key one appeared in 1946 when the newly established RAND Corporation published a *Preliminary Design of an Experimental World-Circling Spaceship*. This study explored the viability of orbital satellites and outlined the technologies necessary for its success. Among its many observations, this one proved especially prescient: "A satellite vehicle with appropriate instrumentation can be expected to be one of the most potent scientific tools of the Twentieth Century. The achievement of a satellite craft would produce repercussions comparable to the explosion of the atomic bomb."[32] In a paper published nine months later, RAND's James Lipp expanded on this idea: "Since mastery of the elements is a reliable index of material progress, the nation which first makes significant achievements in space travel will be acknowledged as the world leader in both military and scientific techniques. To visualize the impact on the world, one can imagine the consternation and admiration that would be felt here if the United States were to discover suddenly that some other nation had already put up a successful satellite."[33] Moreover, Eisenhower had been explicitly warned of this potential in 1955 in a critical National Security Council (NSC) document.[34]

This perspective is a classic application of what analysts often refer to as "soft power." Coined by Harvard University professor Joseph Nye, the term gave a name to an alternative to threats and other forms of "hard power" in international relations aimed at co-opting or attracting potential adversaries to accomplish the desired ends.[35] As Nye contends: "Soft power is the ability to get what

you want by attracting and persuading others to adopt your goals. It differs from hard power, the ability to use the carrots and sticks of economic and military might to make others follow your will. Both hard and soft power are important . . . but attraction is much cheaper than coercion, and an asset that needs to be nourished."[36] In essence, spaceflight represented a form of soft power, the ability to influence other nations through intangibles, such as an impressive show of space capability. It granted to the nation achieving it first, rightly as James Lipp forecast, an authenticity and gravitas not previously enjoyed among the world community.

Failure to appreciate the role of national prestige in space endeavors suggests an overriding tin ear in perceiving political issues. And despite warnings from key administration officials, Eisenhower refused to accept their conclusions. He utterly failed to, in the words of historian Robert A. Divine, "quiet the fears of the American people that Sputnik represented a fundamental shift in military power and scientific achievement from the United States to the Soviet Union."[37] As president—and there is a long list of U.S. chief executives who have done this more effectively than anyone thought possible: Abraham Lincoln, Franklin Delano Roosevelt, John F. Kennedy, and Ronald Reagan come immediately to mind—one critical responsibility is to provide the guidance and direction that calls the American people back from despair and dread to forthright action. Because he did not accept the premise that a psychological effect could result, Eisenhower proved incapable of responding with the leadership required, even if he had had it in him to do so. Instead he and his lieutenants fumbled about, incurring criticism from all sides, and if any leadership was to be offered, it had to come from other sources. Ultimately, a coalition of political opponents, scientists, military space advocates, space exploration enthusiasts, and leaders in the aerospace industry seized the initiative. Eisenhower may be compared to Chip Diller, the pathetic character played by Kevin Bacon, at the end of the 1978 slob humor feature film, *National Lampoon's Animal House*, who screams for people to remain calm in the face of riot and anarchy on the streets when the Delta fraternity attacks a homecoming day parade for Faber College. Eventually the character was flattened on the street by a screaming herd of terrorized spectators. So was Eisenhower.

Was Eisenhower, a military leader used to giving orders and having them carried out without question or criticism, incapable of providing this effective leadership? Was it something in his background or psyche or persona that kept him from offering an optimistic perspective on the situation, outlining effective methods for recovery from what was without question a setback in the Cold War rivalry with the Soviet Union? Instead, his persistent cries of "all is well" without

any reason offered to believe that reminded everyone of just how ineffective his leadership had become. Perhaps he never had it in him to offer this "priestly function" of the presidency. Throughout American history it has fallen to the president to offer consolation and clear vision in the face of crisis.[38] Those who have done so effectively are remembered as great leaders who responded to the trials of their ages. Despite whatever other qualities they might have possessed those who failed to do so, and Eisenhower must be placed in this category, have appropriately been assigned lesser significance. No matter the time or circumstance, the critical component of the president's skill set must be the ability to master the issues and offer perspective, rationale, and clear vision for the nation's course. This Eisenhower utterly failed to do in the context of the Sputnik episode.

NASA: An Unintended Consequence of Sputnik

The standard narrative of the Sputnik crisis has as a major component the creation of NASA in 1958, setting the nation on course for the exploration of space. The part of the story that is almost never incorporated into the master narrative, however, is that the Eisenhower administration resisted efforts to establish a separate space agency. After Eisenhower failed to show the leadership necessary to manage the Sputnik situation, he found pressure from a set of political exigencies, a critical mass of interests, and a key cadre of scientific and technical officials within the federal government and their supporters in universities, corporations, and think tanks to create a powerful, large, and costly federal agency to carry out a more aggressive space exploration program. In so doing, Eisenhower was manipulated by these forces to establish a separate federal entity, something he thought unnecessarily expensive and once created almost impossible to dismantle, to carry out a visible program of space exploration that would counteract the Soviet success with its first Earth satellite. The president, in turn, did not give those advocating major growth in the nation's space effort everything they wanted. Many advocated the creation of a cabinet-level department for science and technology, of which the space mission would be a major component. To a very real extent, Eisenhower's transformation of a small existing federal agency, the National Advisory Committee for Aeronautics, into a somewhat larger but still small organization charged with space exploration represented what might be called a preemptive strike to prevent something that he considered less wise from being done. In addition, in T. Keith Glennan, he placed in charge of NASA a gatekeeper who ensured that it carefully defined a limited mission, moved toward the elimination of duplicate functions within the government, and carried out a balanced program that never sought, in Eisenhower's words, to "be-

come the miraculous solution to all current difficulties," something aggressive space advocates early wanted.[39]

Eisenhower knew he had been bested in this game of domestic political brinksmanship during the winter of 1957–1958 and shrilly denounced its results for the rest of his life. As a result, NASA's creation and initial modest space exploration agenda was the product of the compromise between Eisenhower's vision of exceptionally small government and a set of interest groups that pressed for preeminence in space during the immediate post-Sputnik era. In particular, this cadre of interests sought to create a powerful government bureaucracy, perhaps even a cabinet-level department, to carry out a far-reaching and exceptionally expensive agenda in space. So successful were these groups in promoting their image of space exploration and so ineffective was Eisenhower in responding, that the result was the establishment of an institutional arrangement that has been forced to deal with nearly 50 years of bureaucratic infighting and less than a fully formulated sense of direction along with the budget necessary to carry it out.

One must ask the question, what might have been different had Sputnik not launched first, or at least had Eisenhower proved a more effective leader in responding to it? Eisenhower's pre-Sputnik space program had been neither picayunish nor ineffective. In the summer of 1957, six months into Dwight D. Eisenhower's second term and before the Sputnik launch, the president had asked the National Security Council (NSC) to review the space program of the United States to ensure that the level of investment and progress being made was adequate. He intended to field the first intercontinental ballistic missiles (ICBM) and reconnaissance satellites by the time he left office. These capabilities in the new high ground of space would ensure that the United States could compete effectively with the Soviet Union in the Cold War rivalry that gripped the world. Eisenhower learned that between 1953 and 1957, the nation had spent $11.8 billion on military space activities, mostly on ballistic missile and reconnaissance satellite development. "The cost of continuing these programs from FY 1957 through FY 1963," the NSC reported, "would amount to approximately $36.1 billion, for a grand total of $47 billion."[40]

By any measure this should be considered a significant investment on the part of the Eisenhower administration, and it suggests that Eisenhower had developed a strategy for ensuring U.S. technological comparability, and eventual superiority, in the global game of one-upmanship and rivalry that was the Cold War. When adjusted for inflation, only Presidents Ronald Reagan and Bill Clinton, surprisingly, made similar investments in space technology.[41] Those assets

also found use on both the military and civilian sides of the space program during subsequent years.[42]

Nothing summarizes this balanced, measured approach toward space activities better than a statement Eisenhower made in 1959 at a meeting with top advisors. He outlined three major goals that had to be accomplished:

> The first is that we must get what Defense really needs in space; this is mandatory. The second is that we should make a real advance in space so that the United States does not have to be ashamed no matter what other countries do; this is where the super booster is needed. The third is that we should have an orderly, progressive scientific program, well balanced with other scientific endeavors.[43]

Within the context of this philosophy Eisenhower was willing to expend resources sufficient to meet major objectives, but not to open the floodgates of government expenditures for activities that he believed did not have a viable component.

So what would have been different had there not been a Sputnik? The rocketry programs of the United States were well in hand in 1957, and there is every reason to believe they would have continued on as they did.[44] The same is true of the satellite reconnaissance effort.[45] Space science was being pursued expeditiously through a variety of avenues; even with efforts to send probes to the Moon, and except for an acceleration of effort probably would have been continued along pretty much the same path as after Sputnik.[46] Communications satellites were being pursued by AT&T and might have even achieved success earlier had there been less government involvement.[47] It may be that Sputnik, and especially the failure to manage its ramifications, was responsible for both the good and ill that followed.[48]

Conclusion

At sum, the Sputnik episode of 1957–1958, including the politics of the creation of NASA in 1958 and how it coalesced during the remainder of the Eisenhower administration, all revolved around philosophies of government, priorities of policy, and the role of individual branches of government in responding to a perceived crisis situation in Cold War international relations. Eisenhower believed in a small, focused government that did little, and his response was unequal to the mentality present from opponents and those they could convince to support them. Accordingly, he was forced to create an agency that he did not want to create, and despite his positive public image, NASA was the critical unintended consequence of these events.

The opponents of the Eisenhower administration held a different view of government. Instead, they viewed Sputnik as an opportunity to demonstrate the power of the "positive liberal state" offered the world by the United States. In essence, this position celebrates the use of state power for public good. Space exploration, they argued, was reasonable and forward-looking and led to "good" results for all concerned. Without perhaps seeking to do so, Sputnik offered an important perspective on a debate that has raged over the proper place of state power since the beginning of the United States. As only one example as to how this has played out over time, in the early 19th century, the Whig Party sought an activist government that would accomplish important tasks for the benefit of all. Historian Daniel Walker Howe has eloquently called the Whigs the champions of "the positive liberal state." He wrote:

> this ideal implied the belief that the state should actively seek "to promote the general welfare, raise the level of opportunity for all men, and aid all individuals to develop their full potentialities." The Democrats, by contrast, believed in a "negative liberal state," which left men free to pursue their own definition of happiness. A great advantage of this distinction between the parties is that it implies a connection between the economic and moral aspects of Whiggery. In both cases, the Whigs believed in asserting active control. They wanted "improvements," both economic and moral, and they did not believe in leaving others alone.[49]

Perhaps the most persistent aspect of the Whig world view was the party's resoluteness in using political power for the furtherance of those ideals that it believed were valuable.

Like the Whigs, the Democratic opponents of Eisenhower believed in activist government and the need for a straightforward response to Sputnik to demonstrate American capability. As such, it was more than just bald-faced partisanship; it demonstrated a forthrightness to meet challenges head-on. There are many examples of this, but it is seen most starkly in the governmental activism of the Kennedy administration. As David Halberstam shrewdly observed of them: "if there was anything that bound the men, their followers, and their subordinates together, it was the belief that sheer intelligence and rationality could answer and solve anything." This translated into an ever-increasing commitment to the use of the government to achieve "good ends," and the war on poverty, the Peace Corps, support for civil rights, the Great Society programs of Johnson, and a host of other initiatives are examples.[50] These all represented a broadening of governmental power for what most perceived as positive purposes.

This power of the positive liberal state to explore space has become a symbol of modern America and numerous presidents from both political parties have sought to use this set of beliefs in the last 50 years. For example, President

George W. Bush acted on 14 January 2004 to announce that NASA should focus its energies on human exploration of the Moon and Mars, because of this lament for a visionary space program, à la the penultimate triumphs of the Moon landings in the 1960s and early 1970s. Bush moved to refocus the nation on the grand vision of exploration. He declared that America would return to the Moon between 2015 and 2020. With sufficient diligence and resources, of course, virtually anything humans can imagine in spaceflight may be achieved.[51] His efforts represent only the most recent example of the invoking of spaceflight in the service of a positive liberal state. As such, it exorcises finally the ghost of Eisenhower and his small, modest government approach to spaceflight from the Republican Party. It symbolized more triumph and tragedy, more heroic sacrifice, more strenuous effort than many wars and served as a reminder of all that was positive in the activism of the positive liberal state. It may also demonstrate once again certain unintended consequences as the Vision for Space Exploration unfolds. The story of the Sputnik crisis of 1957–1958 has served many ends throughout the years. Its master narrative in another 50 years may well be different from what is currently understood. How might this occur and what might it portend for the history of spaceflight?

Endnotes

[1] "Farewell Radio and Television Address to the American People," 17 January 1961, *Papers of the President, Dwight D. Eisenhower 1960–1961* (Washington, DC: Government Printing Office, 1961), pp. 1035–1040.

[2] "Farewell Radio and Television Address to the American People," p. 1037.

[3] Alex Roland, "How We Won the Moon," *New York Times* Book Review (17 July 1994): pp. 1, 25.

[4] James Oliver Robertson, *American Myth, American Reality* (New York: Hill and Wang, 1980), p. xv.

[5] Some of the more important of those studies are Conrad Cherry, editor, *God's New Israel: Religious Interpretations of American Destiny* (Englewood Cliffs, New Jersey: Prentice Hall, 1971); R. W. B. Lewis, *The American Adam* (Chicago: University of Chicago Press, 1955); Russell B. Nye, *The Almost Chosen People* (East Lansing: Michigan State University Press, 1966); Richard Slotkin, *Regeneration through Violence: The Mythology of the American Frontier, 1680–1860* (Middletown, Connecticut: Wesleyan University Press, 1973); Richard T. Hughes, *Myths America Lives By* (Urbana: University of Illinois Press, 2003).

[6] Although thorough studies of aerospace myth have yet to be completed, some helpful works for those interested in the subject include James L. Kauffman, *Selling Outer Space: Kennedy, the Media, and Funding for Project Apollo, 1961–1963* (Tuscaloosa: University of Alabama Press, 1994); Norman Mailer, *Of a Fire on the Moon* (Boston: Little, Brown, 1970); Constance Penley, *NASA/TREK: Popular Science and Sex in America* (New York: Verso,

1997); Martin Caiden and Jay Barbree, with Susan Wright, *Destination Mars: In Art, Myth, and Science* (New York: Penguin Studio, 1997); and Roger D. Launius and Bertram Ulrich, *NASA and the Exploration of Space* (New York: Stewart, Tabori, and Chang, 1998).

[7] The importance of memory has been explicitly addressed in Michael Kamman, *Mystic Chords of Memory: The Transformation of Tradition in American Culture* (New York: Alfred A. Knopf, 1991); David Lowenthal, *Possessed by the Past: The Heritage Crusade and the Spoils of History* (New York: Free Press, 1996); Edward Tabor Linenthal, *Sacred Ground: Americans and Their Battlefields* (Urbana: University of Illinois Press, 1991).

[8] Solid overviews of the history of space exploration include William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998); Howard E. McCurdy, *Space and the American Imagination* (Washington, DC: Smithsonian Institution Press, 1997); Roger D. Launius, *Frontiers of Space Exploration* (Westport, Connecticut: Greenwood Press, 1998).

[9] On Sputnik, see these important works: Rip Bulkeley, *The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space* (Bloomington: Indiana University Press, 1991); Robert A. Divine, *The Sputnik Challenge: Eisenhower's Response to the Soviet Satellite* (New York: Oxford University Press, 1993); Paul Dickson, *Sputnik: The Shock of the Century* (New York: Walker and Co., 2001); Matt Bille and Erika Lishock, *The First Space Race: Launching the World's First Satellites* (College Station: Texas A&M University Press, 2004).

[10] On Apollo, see John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Massachusetts: MIT Press, 1970); Walter A. McDougall, *...The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985); Charles A. Murray and Catherine Bly Cox, *Apollo, the Race to the Moon* (New York: Simon and Schuster, 1989); and Andrew Chaikin, *A Man on the Moon: The Voyages of the Apollo Astronauts* (New York: Viking, 1994). Good introductions to the history of planetary exploration may be found in Ronald A. Schorn, *Planetary Astronomy: From Ancient Times to the Third Millennium* (College Station: Texas A&M University Press, 1998).

[11] The standard work on this subject is Constance McL. Green and Milton Lomask, *Vanguard: A History* (Washington, DC: NASA SP-4202, 1970; reprint edition, Smithsonian Institution Press, 1971).

[12] A standard recounting of this may be found in David S. F. Portree, *NASA's Origins and the Dawn of the Space Age* (Washington, DC: NASA Monograph in Aerospace History #10, 1998).

[13] "National Aeronautics and Space Act of 1958," Public Law #85-568, 72 Stat., 426. Signed by the president on 29 July 1958, Record Group 255, National Archives and Records Administration, Washington, DC; Alison Griffith, *The National Aeronautics and Space Act: A Study of the Development of Public Policy* (Washington, DC: Public Affairs Press, 1962), pp. 27–43.

[14] Roger D. Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, Florida: Krieger Publishing Co., 1994), pp. 29–41.

[15] The standard works on this subject are: Asif A. Siddiqi, *Challenge to Apollo: The Soviet Union and the Space Race, 1945–1974* (Washington, DC: NASA SP-2000-4408, 2000) and James J. Harford, *Korolev: How One Man Masterminded the Soviet Drive to Beat America to the Moon* (New York: John Wiley and Sons, 1997).

[16] For a discussion of the historiography of the Moon landings, see Roger D. Launius, "Interpreting the Moon Landings: Project Apollo and the Historians," *Technology in Society* 22 (September 2006): pp. 225–255; Roger D. Launius, "On the Bookshelf: Indispensable Books on the Apollo Program," *Aerospace America* (September 2006): p. B7. Essential reading on the subject includes Logsdon, *The Decision to Go to the Moon*; McDougall, *...The Heavens and the Earth*; Murray and Cox, *Apollo, the Race to the Moon*; Chaikin, *A Man on the Moon.*

[17] On American exceptionalism, see Seymour Martin Lipset, *American Exceptionalism: A Double-Edged Sword* (New York: W. W. Norton and Company, 1997); Charles Lockhart, *The Roots of American Exceptionalism: Institutions, Culture and Policies* (New York: Palgrave Macmillan, 2003); Deborah L. Madsen, *American Exceptionalism* (Oxford: State University of Mississippi Press, 1998); David W. Noble, *Death of a Nation: American Culture and the End of Exceptionalism* (Minneapolis: University of Minnesota Press, 2002).

[18] Lawrence A. Langer, *Admitting the Holocaust: Collected Essays* (New York: Oxford University Press, 1995), p. 6.

[19] This paragraph, and the one that follows, are based on information contained in Green and Lomask, *Vanguard.*

[20] Paul L. Dickson, *Sputnik: The Shock of the Century* (New York: Walker and Co., 2001).

[21] Dwight D. Eisenhower, *The White House Years: Waging Peace* (Garden City, New York: Doubleday, 1965), p. 211.

[22] Homer Hickam Jr., *Rocket Boys: A Memoir* (New York: Delacorte Press, 1998).

[23] Margaret Mead Telegram to Colleagues, 6 October 1957; Margaret Mead to Melville Jacobs, Accompanying Message to "Emergency Study of Attitudes towards the Satellite," 7 October 1957, both in File 87: Correspondence, Rhoda Metraux Papers, Library of Congress Manuscript Division, Washington, DC. I am grateful to Rebecca Mueller for calling my attention to this material and undertaking initial research in the collection.

[24] Response of 22-year-old female and 40-year-old white male, File 87: Correspondence, Rhoda Metraux Papers, Library of Congress Manuscript Division.

[25] Rebecca Mueller, "Draft of Mead/Metraux Study," 2 December 2006, copy in possession of author.

[26] International Affairs Seminars of Washington, "American Reactions to Crisis: Examples of Pre-Sputnik and Post-Sputnik Attitudes and of the Reaction to other Events Perceived as Threats," 15–16 October 1958, U.S. President's Committee on Information Activities Abroad (Sprague Committee) Records, 1959–1961, Box 5, A83-10, Eisenhower Library.

[27] George E. Reedy to Lyndon B. Johnson, 17 October 1957, Lyndon B. Johnson Presidential Library, Austin, Texas.

[28] Speeches of Lyndon B. Johnson, Tyler, Texas, 18 October 1957, and Austin, Texas, 19 October 1957, both in Statements File, Box 22, Lyndon B. Johnson Presidential Library, Austin, Texas.

[29] International Affairs Seminars of Washington, "American Reactions to Crisis," 15–16 October 1958, NASA Historical Reference Collection.

[30] Richard H. Rovere, "Eisenhower Revisited—A Political Genius A Brilliant Man?" *New York Times* Magazine (7 February 1971): p. 14.

[31] Robert J. McMahon, "Eisenhower and Third World Nationalism: A Critique of the Revisionists," *Political Science Quarterly* 101, No. 3 (1986): pp. 453–473; Vincent P. de Santis, "Eisenhower Revisionism," *The Review of Politics* 38 (April 1976): pp. 190–207.

[32] Project RAND, Douglas Aircraft Company's Engineering Division, Preliminary Design of an Experimental World-Circling Spaceship (SM-11827), 2 May 1946.

[33] Quoted in Virginia Campbell, "How RAND Invented the Postwar World: Satellites, Systems Analysis, Computing, the Internet—Almost all the Defining Features of the Information Age Were Shaped in Part at the RAND Corporation," *Invention & Technology* (Summer 2004): pp. 50–59, quote from page 53. An important historical article on the studies proposing orbital satellites is R. Cargill Hall, "Early U.S. Satellite Proposals," *Technology and Culture* 4 (Fall 1961): pp. 410–434.

[34] National Security Council, NSC 5520, "Draft Statement of Policy on U.S. Scientific Satellite Program," 20 May 1955, Presidential Papers, Eisenhower Library, Abilene, Kansas.

[35] The term was coined in Joseph S. Nye, *Bound to Lead: The Changing Nature of American Power* (New York: Basic Books, 1990). See also Joseph S. Nye, *Soft Power: The Means to Success in World Politics* (New York: Public Affairs, 2004).

[36] Joseph S. Nye, "Propaganda Isn't the Way: Soft Power," *The International Herald Tribune* (10 January 2003).

[37] Divine, *The Sputnik Challenge*, p. 205.

[38] Bruce Kuklick, *The Good Ruler: From Herbert Hoover to Richard Nixon* (New Brunswick, New Jersey: Rutgers University Press, 1988), pp. 101, 115–116.

[39] On Glennan, see J. D. Hunley, editor, *The Birth of NASA: The Diary of T. Keith Glennan* (Washington, DC: NASA SP-4105, 1993).

[40] S. Everett Gleason, "Discussion at the 329th Meeting of the National Security Council, Wednesday, July 3, 1957," 5 July 1957, 2, NSC Records, DDE Presidential Papers, Eisenhower Library, Abilene, Kansas.

[41] President Ronald Reagan spent $233.02 billion on space issues in his eight years in office. President Bill Clinton spent $230.14 billion during his eight years in office. By contrast, President Dwight Eisenhower's spending was $183.69 billion. All of these are in inflation-adjusted dollars. Calculated using data in Appendix E-1A, "Space Activities of the U.S. Government," *Aeronautics and Space Report of the President, Fiscal Year 2003 Activities* (Washington, DC: NASA NP-2004-17-389-HQ, 2004), p. 140.

[42] Much has been made of dual-use technology over the years, and space access has been an especially important part of this capability. On space access, see Roger D. Launius and Dennis R. Jenkins, editors, *To Reach the High Frontier: A History of U.S. Launch Vehicles* (Lexington: University Press of Kentucky, 2002).

[43] Brig. Gen. A. J. Goodpaster, "Memorandum of Conference with the President, October 12, 1959," 23 October 1959, Records of the White House Office of Science and Technology, Box 12, Eisenhower Library, Abilene, Kansas.

[44] See Eugene M. Emme, editor, *The History of Rocket Technology: Essays on Research, Development, and Utility* (Detroit, Michigan: Wayne State University Press, 1964); Richard P. Hallion, "The Development of American Launch Vehicles since 1945," in Paul A. Hanle and Von Del Chamberlain, editors, *Space Science Comes of Age: Perspectives in the History of the Space Sciences* (Washington, DC: Smithsonian Institution Press, 1981), pp. 115–134; Roger D. Launius, "Between a Rocket and a Hard Place: The Challenge of

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[45] Three important books on the early satellite reconnaissance program have been published: Dwayne A. Day, John M. Logsdon, and Brian Latell, editors, *Eye in the Sky: The Story of the Corona Spy Satellite* (Washington, DC: Smithsonian Institution Press, 1998); Robert A. McDonald, *Corona between the Sun and the Earth: The First NRO Reconnaissance Eye in Space* (Bethesda, Maryland: ASPRS Publications, 1997); Curtis Peebles, *The Corona Project: America's First Spy Satellites* (Annapolis, Maryland: Naval Institute Press, 1997). See also William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Random House, 1987) and Jeffrey T. Richelson, *America's Secret Eyes in Space: The U.S. Keyhole Spy Satellite Program* (New York: Harper and Row, 1990).

[46] The early history of this effort is well told in Homer E. Newell, *High Altitude Rocket Research* (New York: Academic Press, 1953); Hall, "Early U.S. Satellite Proposals"; R. Cargill Hall, "Origins and Development of the Vanguard and Explorer Satellite Programs," *Airpower Historian* 11 (October 1964): pp. 101–112; R. Cargill Hall, *Lunar Impact: A History of Project Ranger* (Washington, DC: NASA SP-4210, 1977); David H. DeVorkin, *Science with a Vengeance: How the Military Created the US Space Sciences After World War II* (New York: Springer-Verlag, 1992).

[47] This is the thesis of David J. Whalen, *The Origins of Satellite Communications, 1945–1965* (Washington, DC: Smithsonian Institution Press, 2002).

[48] One could make the case that considerable resources were spent on useful activities, such as science and technology, education, and retraining of workforces. Even so, some scholars minimize its long-term effect. See Herbert Kliebard, *The Struggle for the American Curriculum* (New York, New York: Routledge, second edition, 1995); "The Nationalization of U.S. Science," *Fortune* (September 1976): p. 158.

[49] Daniel Walker Howe, *The Political Culture of the American Whigs* (Chicago: University of Chicago Press, 1979), p. 20.

[50] David Halberstam, *The Best and Brightest* (New York: Viking, 1973), pp. 57, 153.

[51] White House Press Release, "Fact Sheet: A Renewed Spirit of Discovery," 14 January 2004, available online at http://www.whitehouse.gov/news/releases/2004/01/20040114-1.html, accessed 4 April 2004.