PRESIDENTIAL LEADERSHIP IN THE DEVELOPMENT OF THE U.S. SPACE PROGRAM

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PRESIDENTIAL LEADERSHIP AND THE DEVELOPMENT OF THE U.S. SPACE PROGRAM

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THE MYTH OF PRESIDENTIAL LEADERSHIP: FALSE HOPES AND THE DECLINE OF THE U.S. SPACE PROGRAM

Chapters

Introduction: The Imperial Presidency in the History of Space Exploration

by

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The aggrandizement of the American presidency during the administrations of John F. Kennedy, Lyndon B. Johnson, and Richard M. Nixon prompted a number of commentators to criticize the ease with which the chief executive could overwhelm other centers of power in the United States. Responding to the growth of presidential power culminating in the Watergate affair, commentators argued that the expansion and abuse of presidential power relative to the Congress and courts had created a governmental crisis. Because of these episodes historian Arthur M. Schlesinger, Jr., decried the creation of what he called "the imperial presidency."[1] Like other commentators in the mid-1970s, Schlesinger feared the effect of presidential exaltation on the traditional system of checks and balances.

This book deals with people who found relief rather than anxiety in the imperial presidency. Persons who worked to promote the U.S. space program saw in the powerful presidency a solution to their most pressing problem--how to achieve the unfettered political support necessary to carry out projects like the voyage to the Moon in a political system that typically

resisted long-range commitments. For them, an emphasis on presidential leadership made possible that type of support. For people advancing science and technology policy, the imperial presidency was a godsend rather than a loss.

Concern over the imperial presidency did not last long in academic circles. Presidential power was in full decline by the administrations of Gerald R. Ford and Jimmy Carter in the latter part of the 1970s. Historians and political scientists like Thomas Cronin issued tracts lamenting the gap between public expectations and presidential power.[2]

People promoting space policy generally ignored these developments. Bewitched by the example of President John F. Kennedy's 1961 commitment to send Americans to the Moon, they continued to profess their belief that strong presidential leadership would overcome the difficulties created by political checks and balances. Their faith in the ability of presidents to dominate the political system persisted long after outside commentators had concluded, in the words of Hugh Heclo, that presidential government was an illusion.

> Presidential government is the idea that the president, backed by the people, is or can be in charge of governing the country. . . . This is an "illusion" in the fullest sense of the word, for it is based on appearances that mislead or deceive.[3]

By examining the history of presidential leadership in the U.S. space program, this book reveals how the illusion of

presidential government affected the development of public policy. Not unexpectedly, the illusion created expectations that could not be satisfied. Well into the period of presidential decline, supporters of the National Aeronautics and Space Administration (NASA) waited for the return of the omnipotent executive. They continued to press for the salvation that presidential leadership would provide. Their faith in the ability of presidents to free them from the political thicket prevented them from adopting a more realistic view of the forces affecting space policy. Not until the 1990s did this faith wane.

The ability of NASA supporters to find salvation in a potent president drew its inspiration from John F. Kennedy. President Kennedy, certainly, had few illusions about the extent of presidential power when he delivered his speech challenging Americans to commit themselves "to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth." He delivered those words on May 25, 1961, as part of a speech before a joint session of Congress dealing with a number of what he called urgent national needs brought on by the rigors of the Cold War rivalry with the Soviet Union. Kennedy departed extensively from his prepared text, pleading with leaders of congressional committees to "consider this matter carefully . . . as it is a heavy burden." Among the words delivered to Congress that do not appear in the prepared text appears the following demur.

There is no sense in agreeing, or desiring, that the United

States take an affirmative position in outer space unless we are prepared to do the work and bear the burdens to make it successful.[4]

Kennedy knew that Congress could undercut his legislative initiatives by refusing to authorize them or, worse still, authorizing his initiatives without appropriating the funds necessary to carry them out. He had a very clear grasp of reality.

When Kennedy entered the White House in early 1961, many persons hoped that his inauguration would end years of political deadlock most recently perpetuated by conflict between the Democratic congress and the Republican president, Dwight D. Eisenhower. This did not occur. Kennedy's effort to break up the conservative coalition on the House Rules Committee succeeded by a mere five votes, and only with the help of Republicans.[5] In the Senate, his own party refused to modify the filibuster rule, essentially scuttling any hope Kennedy might have had for civil rights legislation in that session. Republicans provided the margin necessary to squeak Kennedy's emergency feed grains bill through the House, while conservatives rallied to shoot down Kennedy's minimum wage bill by substituting a watered-down measure.[6] Kennedy's experience confirmed the words of political scientist Clinton Rossiter, who had written during the mid-point of the Eisenhower administration that the president's tools for influencing Congress were "not one bit sharper than they were forty years ago."[7]

Kennedy could rely upon neither party loyalty nor presidential prestige to secure congressional support for his measures. As Richard E. Neustadt had warned in 1960, the powers of the presidency seemed to amount to little more than the power to persuade.[8] Kennedy was obliged to use his powers of persuasion to forge individual coalitions for each new legislative initiative that he sent to Capitol Hill. Frustration over the lack of presidential power led political scientist James McGregor Burns to publish The Deadlock of Democracy in 1967, in which he argued that congressional committee leaders constituted a separate political party independent of that which presidents employed to win election.[9]

On the way back from Capitol Hill after his speech, Kennedy worried aloud about the lack of enthusiasm for his space exploration proposals.[10] Based on the experience of the previous four months, he had good reason to be concerned about congressional support. Proposals far more modest than the space initiative had encountered opposition from various sectors of the political spectrum. He had not yet discovered at that time a reliable method for overcoming resistance. The May 25 speech seemed to change that. Kennedy's space proposals sped through the Congress. The bill authorizing the lunar buildup passed the Senate one month later on June 28. There was so little opposition that the Senators did not even bother to take a recorded vote. The debate in the House was perfunctory, and the bill passed by a lop-sided vote of 354 to 59. Kennedy noted the

"overwhelming support by members of both parties" as he signed the bill authorizing his space initiatives on July 21.[11]

For many years, space boosters had searched for the key that would unlock the public treasury and provide them with the largess necessary to explore space. They had promoted space exploration through science fiction and popular astronautics. They had tied their dreams to the ballistic missile development movement, to the International Geophysical Year, and to public fears about the Cold War. They had received for this effort during the Eisenhower administration sufficient political approval for a modest program of satellite research and a single-seat Mercury capsule that only once spent more than a day in space.

With a single public declaration, Kennedy created a crash program to send humans to the Moon, as well as a supporting satellite and rocket program. Without a challenge, and somewhat amazingly, other politicians deferred to the Kennedy goal. Congress did not undercut the initiative. NASA received the rarest of political commitments--eight years of uninterrupted support for a long-range science and technology endeavor. The speech in which Kennedy set the lunar goal remains one of the most memorable moments of that generation, in part because the results departed so dramatically from past political norms. With such results, how could space boosters not wish for an encore?

Pundits applauded Kennedy's lunar commitment as well as his deft handling of other Cold War emergencies such as the 1961

Berlin crisis and the 1962 Cuban missile crisis, as examples of the president's ability to act alone. Most other observers did not treat the future expansion of presidential power with as much favor. In 1970 George Reedy, who had served as a special assistant to President Lyndon Johnson, wrote a book in which he argued that the ability of presidents to rise above external dissent and criticism was isolating them from the very forces designed to hold them in check. "There is built into the presidency," Reedy argued, "a series of devices that tend to remove the occupant of the Oval Room from all of the forces which require most [people] to rub up against the hard facts of life on a daily basis."[12]

Reedy was responding to the actions of Presidents Johnson and Nixon, who behaved more like monarchs than constitutional executives. Occasionally they and their aides also behaved like criminals. The growth of presidential power, historian Arthur Schlesinger wrote in 1973, produced "an unprecedented exclusion of the rest of the executive branch, of Congress, of the press and of public opinion" from decisions involving war and peace and the economy. Accordingly, the imperial presidency grew at the expense of other centers of power in the American polity. "Like the cowbird, it hatched its own eggs and pushed the others out of the nest," Schlesinger observed.

> If this transformation were carried through, the President, instead of being accountable every day to Congress and public opinion, would be accountable every four years to the

electorate. Between elections, the President would be accountable only through impeachment and would govern, as much as he could, by decree.[13]

People in the business of space exploration neither lamented this rise of presidential power nor did they deplore the ability of presidents to rule by decree. Instead, they asked for it to be done again in their requests for presidential endorsements for aggressive space activities. They concluded that the seeming ability of President Kennedy to issue a clear national commitment on space in 1961 could be repeated later, and in so doing it would give NASA and its programs they political protection they needed to turn general visions into engineering accomplishments. Especially within the science and technology bureaucracy, strong presidential leadership was viewed as the essential ingredient necessary to allow the United States to compete successfully with the Soviet Union in the realm of high technology.

The rise of the power of the presidency in space endeavors had been noted as early as the 1950s. For example, when President Dwight Eisenhower had proposed an exploration program that space boosters viewed as excessively timid, the boosters appealed to both the Congress and the White House. The House Space Committee attacked Eisenhower's agenda as a "beginner" program that lacked "proper imagination and drive."[14] In spite of congressional pressure for a more ambitious effort, led by personalities no less powerful than Senate Majority Leader Lyndon Johnson, the Congress was unable to shake the administration from

its plan. An advisory committee report prompted Eisenhower to revisit his position just before he left office. After Eisenhower refused to change his mind, James E. Webb, appointed by President Kennedy as the second NASA Administrator, appealed Eisenhower's depressed space funding to Kennedy.[15] What others, including Congress, could not do in bending the president in nearly three years, Kennedy did with one speech, thereby creating the belief that the future of the U.S. space program ultimately depended upon the willingness of the president to set long-range objectives.

This turning toward the executive has guided subsequent virtually all subsequent efforts to establish long-range goals in space that went beyond the landings on the Moon. All of those efforts were geared toward obtaining an executive decision, with Congress seeming to play a secondary role. In 1969 President Richard Nixon established a special Space Task Group to advise him "on the direction which the U.S. space program should take in the post-Apollo period."[16] Eleven years later a special transition team urged incoming President Ronald Reagan to make a "definitive statement on space policy" at the earliest possible time. "A viable space program," the transition team members wrote, "must have purpose and direction." Without strong presidential leadership, they warned, the space program would "waste away."[17]

When Congress joined the clamor for "future policies for the United States civilian space program," they too turned to the

president. In 1984 the Congress required the president to establish a special National Commission on Space.[18] In 1990 another special advisory committee was formed to "consider the future long-term direction of the space program." This one reported its recommendations to Vice President Dan Quayle.[19]

As the White House became increasingly important as both the maker and executor of space policy during the 1960s, the process for reviewing initiatives within the Executive Office of the President became more elaborate. As his first major act, for example, President Kennedy's executive assistant for space revived the White House Space Council by drafting legislation making then Vice President Lyndon Johnson its chair. The vice president acted as intermediary to resolve disputes involving two or more agencies, especially NASA and the Department of Defense.[20] He also consolidated space policy functions within the White House, to the extent that by the end of the 1960s there was little real space policy-making anywhere else in the government despite the very real interests that resided outside. Taking an approach that differed in form and not substance, Richard Nixon relied upon his Office of Management and Budget to analyze space issues and resolve interdepartmental issues while the president retained sole control of space policy formulation.[21] In 1973, Nixon abolished the office of Science Advisor to the President, in part to remove the scientists' power base and make them more dependent upon him.[22]

As if in an effort to perpetuate the myth of executive

leadership the space policy apparatus within the White House continued to grow even as presidential power declined. In the wake of the Watergate debacle that led to Nixon's resignation in 1974, Congress and the judicial branch began to restrict the prerogatives that had flowed to the U.S. presidency during its "imperial" years. This was the case not only in such obvious areas as the War Powers Act of 1973 and the 1974 judicial rulings on executive privilege, but also in such matters as the direction of the U.S. civil space program. By the time that President Ronald Reagan established the Senior Interagency Group for Space in 1982, a sub-cabinet council chaired by the Assistant for National Security Affairs and empowered "to provide for orderly and rapid referral of space policy issues to the President for decisions," other executive branch organizations and Congress had reclaimed much of the initiative in defining and promulgating space policy.[23] Not since that time has any president been able to announce an Apollo-like program without having to deal with powerful opposition. Even so, in 1989 the machinery for making presidential space decisions grew more complex. President George Bush recreated the National Space Council to "oversee the implementation . . . of the president's space policy"[24] among seven executive agencies then participating in the executive policy process for space, including NASA.

As the machinery for making executive decisions became more elaborate, the language of presidential politics in space became more definitive. Early in his career, in his May 1961 speech

before the Congress, Kennedy practically begged the law-makers to approve his initiatives in space. Eleven years later, President Nixon's statement endorsing the space shuttle as America's next major initiative did not even mention the legislative branch. "I have decided today," Nixon announced from his presidential retreat in California, "that the United States should proceed at once with the development of an entirely new type of space transportation system."[25] Not understanding that the star of the imperial presidency had fallen, Ronald Reagan was even less deferential when, like President Kennedy, he appeared before a joint session of Congress in 1984 to launch the next major human space flight initiative. He told the lawmakers that "Tonight I am directing NASA to develop a permanently manned space station and to do it within a decade."[26] Only when George Bush proposed in 1989 that the United States undertake a massive effort to return to the Moon and go onto Mars did the president acknowledge the growth in congressional power. Speaking from the steps of the Smithsonian's Air and Space Museum on the national mall, Bush noted that our future as a spacefaring nation would be decided just up the street at the United States Congress.[27]

While the laudation of presidential power captivated space buffs, scholars of the American executive observed its slow decline. These scholarly efforts were practically unrecognized by space buffs. "Few if any of our presidents have been the giants American mythology makes them out to be," Thomas Cronin explained in a book first published in 1975.[28] By overestimating

the powers of the office, Cronin warned, people set up unrealistic expectations that would inevitably be disappointed. The ink was hardly dry on Arthur Schlesinger's Imperial Presidency when the Congress repossessed the president's war making powers, established a congressional budget process, and drove Richard Nixon from office.[29] Textbooks took note of these developments, but space buffs did not.[30] "As soon as the clamor over the 'imperial presidency' of Vietnam and Watergate subsided, the presidency appeared less conquering than conquered," political scientist Aaron Wildavsky observed in The Beleaguered Presidency. Even the sanctimonious "two presidencies" theory, which presumed that executives could escape the constraints of domestic politics by engaging in foreign affairs, seemed dead. Space buffs had hoped to elevate executive prerogatives by tying space policy to foreign affairs. This was nonsense, Wildavsky argued. Ideological and partisan divisions now affected foreign affairs as much as domestic policy and "the presidency of John F. Kennedy proved to be the dividing line." The experience that caused space buffs to worship at the alter of presidential power was to political scientists the top of the mountain. It had been all downhill since.[31]

This illumination dawned slowly on the people who had tied their hopes to presidential prerogatives. NASA officials and their allies greeted Ronald Reagan's 1984 directive as a political mandate to take the "next logical step" in space. They established a work schedule to produce a space station, as Reagan

had directed, by 1994.[32] Nothing happened. Eight years after President Kennedy offered his challenge, Americans stood on the Moon. Ten years after President Reagan issued his directive, NASA and its political overseers were still debating space station design.

The inevitable confrontation with reality for advocates of the space program occurred with the debate over the Space Exploration Initiative (SEI). In 1989, President George Bush endorsed the ultimate space-faring objective: human interplanetary travel. He proposed that the United States establish a lunar base and organize a human expedition to Mars, a decision on which he elaborated one year later.

> Leadership in space takes more than just dollars: It also takes a decision. And so, I'm announcing one today. . . . I believe that before Apollo celebrates the 50th anniversary of its landing on the Moon the American flag should be planted on Mars.[33]

NASA had already established an Office of Exploration in anticipation of the mandate and the Bush administration asked Congress for a down payment on the mission funds.

Outside the executive office the presidential proposal was met with disbelief. In spite of a flurry of executive branch activity, Congress refused to appropriate even the modest funds necessary to study expedition technology. Bush complained that Congress "voted to pull the plug, completely gutting the seed money we proposed for the Moon/Mars mission." Recognizing at

last the limits of presidential power, he observed: "Space used to be a bipartisan effort: an American effort . . . Unfortunately, not everyone on Capitol Hill shares this commitment to investing in America's future."[34]

The demise of the Space Exploration Initiative, concurrent with the continuing troubles of the earth-orbiting space station, forced NASA officials and their allies to question their long-held assumptions about presidential omnipotence. Their faith in the ability of presidential commitments to free them from the constraints of Washington politics declined, albeit belatedly. For example, Thomas O. Paine, NASA administrator 1968-1970, put relentless pressure on President Nixon to make a commitment to NASA's post-Apollo goals, telling Nixon a month after he took office that he had to take affirmative leadership to initiate a "general directive to define the future goals of manned space flight in the next few months, prior to your final decisions on the plans that will be recommended to you on September 1 by the members of the Task Group you have established."[35]

Nixon was more realistic, and suggested as early as 1970 that space buffs stop thinking about space activities "as a series of separate leaps, each requiring a massive concentration of energy." He added:

> Space expenditures must take their proper place within a rigorous system of national priorities. What we do in space from here on in must become a normal and regular part of our national life.[36]

Space had ceased to be special by the time the first Americans reached the Moon, although it took twenty years for space buffs to realize it. Kennedy's decision excited the expectation that presidential leadership could carry public policy above petty politics.

The symbolism of Kennedy's Apollo commitment held special appeal for the true believers of space exploration. To them, the lunar decision suggested that space exploration deserved special treatment within the American political system. The decision to go to the Moon suggested that a president could overcome partisan divisions and lead the nation to great accomplishments, if only the objective was properly framed. Many argued that the subsequent ills of the space program could be traced to the unwillingness of more recent presidents to make "Apollo-like" public commitments.[37]

The Apollo Program, while an enormous achievement, left a divided legacy for NASA. The "golden age" of Apollo created for the agency an expectation that the issuance of a major space goal by the president would always bring NASA a broad consensus of support and provide it with resources as well as the license to dispense them as agency leaders saw fit. Most NASA officials did not understood how truly exceptional the Apollo mandate was. After the glamor of Kennedy's moment dimmed, space policy came to rest alongside all of the other priorities of government for which presidential leadership played a diminishing role. This eventually disappointed the people who believed in the power of

presidents to make space exploration special. The Apollo decision was an anomaly in the history of the U.S. space program.[38]

Indeed, in reality the larger questions of space policy and the programs that have developed from it are a microcosm of larger trends present in the U.S. government. The rise and fall of the presidential power is a key component in American politics in general just as it is in the U.S. space program. To explore these themes in the conduct of U.S. space policy since the 1950s the NASA History Office and the Center for Congressional and Presidential Studies organized a two-day symposium in the spring of 1993 that brought together senior scholars of the American presidency, government executives, and interested students. Seven major essays on presidential space policy and foreign affairs cooperation in space were produced. They analyzed presidential leadership and the relationship of the president with the many agencies of the Executive Branch, the Congress and its staff, special groups outside of the government, and the larger American public. Each presentation recognized that the U.S. space program was a policy issue as well as a scientific, technical, and engineering effort. Recent discussions about the role of the President in charting the course the space program raise the larger issue of the influence of the office overall.

The symposium sought to bring together some of the most thoughtful scholars and senior government officials in an atmosphere conducive to an honest review of the U.S. space

program. Some of the leading scholars of the American presidency participating in the symposium. None of them, and this was an important aspect of their desirability, had written specifically about the space program before and they were therefore able to comment on it from the larger perspective of public policy and presidential leadership. Because of this fresh perspective, the presentations contributed to an overall reassessment of the role of the president in defining and directing the space program.

Five of the essays in this volume deal with specific presidencies, their approach to the development of space policy, and their leadership role in framing NASA's mission. Fred I. Greenstein and David Callahan continue the revision of Dwight D. Eisenhower as president that has been underway for more than a decade by looking at his space program. They argue that the image of Eisenhower as an amiable "do-nothing" president who smiled and played golf while crises threatened to destroy the nation is incorrect. Eisenhower worked hard behind the scenes while giving the appearance of inaction, and in most instances his indirect approach to leadership was highly effective. He used the power of the emergent "imperial presidency" to establish a modest effort that took a measured approach toward space, while doing so in an inconspicuous way.

Michael R. Beschloss' essay on John F. Kennedy and the decision to go to the Moon suggests that the early 1960s were the high point of the presidential power in formulating space policy. Using a wealth of documentary information, Beschloss notes that

Kennedy's 1961 announcement came at a crucial time in the history of the United States when the president could exert himself in Cold War activities with a relatively free hand. The Apollo decision, furthermore, became a model for space promoters for a generation, as the best means of continuing their far-reaching and assertive space exploration agenda.

Robert Dallek's essay on Lyndon B. Johnson and the politics of the space program comments on how Johnson used both his presidential office and his unparalleled knowledge of Congress as a tool to ensure that Apollo was completed within the time constraints imposed by the fallen Kennedy. At the same time, Johnson refused to endorse any other expensive long-term space endeavors. Both Johnson's protection of Apollo from assault by political opponents and his refusal to endorse additional big space projects reinforced the belief of the proponents of an aggressive space program in the invincibility of their agenda provided the president supported it. By the time that Johnson left office, space exploration advocates were firmly committed to the idea of the "imperial presidency" as the only sure means of preserving the future of a large space program. They did not understand, Dallek makes clear, the difficulty Johnson had in maintaining a coalition of interests in support of Apollo and how he used divergent selling points for it among members of Congress.

Joan Hoff's scintillating essay on the space program under Richard Nixon and his successors in the 1970s attacks head-on the

faith of space program advocates in the power of the presidency. Nixon refused to endorse a strenuous follow-on effort to Apollo but did so without convincing space program leaders that his support would mean little in the social and political environment near the end of the 1960s and at the beginning of the 1970s. This further reinforced the belief among space enthusiasts that the president was strong enough to make their goals a reality provided he could be convinced of their legitimacy. Rather than accommodate themselves to the new realities of policy formulation, space supporters placed the blame on the personality of the president and his unwillingness to step up to the kind of "greatness" that Kennedy had exhibited.

Lyn Ragsdale's chapter describes how two Republican presidents of the 1980s, Ronald Reagan and George Bush, did invoke the rhetoric of Kennedy and whole-heartedly endorsed an exceptionally aggressive space program. At the same time, their policies never received strong political support from Congress, other sectors of the federal government, and the public at large. Only during the Bush administration did space exploration advocates begin to see that the idea of an "imperial presidency" mandating strong space efforts was a myth. As Ragsdale shows, the twin political failures of the space station and the space exploration initiative prompted space policy analysts to alter their perspectives on the role of presidential leadership in favor of one more attuned to the issues of representative government.

Only in the realm of international cooperation and competition in space, the areas where the presidency has traditionally exerted the most significant influence, did the idea of an "imperial presidency" really have merit. Robert H. Ferrell surveys this subject, noting the broad foreign policy objectives that the president has emphasized and how these have been carried out, often without great fanfare and opposition, by appointed officials of the executive branch.

John M. Logsdon explores the relationship between the desire for presidential leadership and the use of the space program to assist in achieving a position of national supremacy. Finally, the editors of the volume conclude with a basic commentary on NASA's search for another paradigm to shape their space policy agenda. Since Kennedyesque leadership statements have been a chimera in the agency's history, what forces do political coalitions respond to in supporting the space program? The editors examine the role of political partisanship, basic ideology, and "pork barrel" politics in shaping the national space agenda.

Taken altogether, this collection of essays provides an analysis of the interrelationships of the president and other branches of government in formulating and conducting space policy. Each contribution emphasizes the myth of the "imperial presidency" and the reliance of leaders of the U.S. civil space program on presidential edicts to forward their exploration agenda. In many respects this was an honest mistake on the part

of NASA leaders. The Apollo decision and its accomplishment under Kennedy and Johnson blinded NASA to reality and made it hard for the agency's leaders to adjust to a different environment. Since that brief moment in the 1960s, the agency has had to wrestle with policy questions in the presidential arena in a far different manner. That it has failed to do so successfully in every instance is the central theme of this volume.

The symposium that led to the preparation of this book took place at the American University on March 25-26, 1993. James A. Thurber, director of the Center for Congressional and Presidential Studies at American University, was an early supporter of the project and deserves our thanks. Without his assistance this book could not have been completed. We also wish to acknowledge the help of the staff of the NASA History Office: Patricia Shephard, who provided administrative support; Lee D. Saegesser, who helped track down illustrations and sources for footnotes; and J.D. Hunley, who besides doing most of the editing, read and edited various drafts of the collection and provided valuable advice. In addition to these individuals, we wish to acknowledge and thank the following people who aided us in a variety of ways to complete this book: Mark J. Albrecht, Giles Alston, Donald R. Baucom, Roger L. Bilstein, Rip Bulkeley, Tom D. Crouch, Philip Culbertson, Virginia P. Dawson, Duane Day, Henry C. Dethloff, Andrew J. Dunar, Tim Evanson, Linda Neumann

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Chapter 1

The Reluctant Racer: Dwight D. Eisenhower and United States Space Policy

by

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and

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> QUESTION. Mr. President, the burden of some recent statements on Capitol Hill, primarily by generals, has been that we are well behind the Russians in missile development, with little or no prospect of catching up with them in the near future. I'd like to ask you, sir, as far as man's effort to enter space, as well as the development of military missiles, do you feel any sense of urgency in catching up with the Russians?
>
> THE PRESIDENT. I am always a little bit amazed about this business of catching up. What you want is enough, a thing that is adequate. A deterrent has no added power, once it has become completely adequate, for compelling the respect of any potential opponent for your deterrent and, therefore, to make him act prudently.[1]

The story of Dwight D. Eisenhower and United States space policy is that of a reluctant participant in a highly public

program of research and development which had all of the earmarks of a race, but which the participant himself resolutely defined as a non-race. It is in part a story of technological competition, but in larger part it is a story of political competition--partisan national competition between a popular president and a congressionally-based coalition of members of the opposite party and cold war international competition between the United States and the Soviet Union. It is also a story of the reluctance of a president to invoke the presidential office to mandate an aggressive space program. In that sense, Eisenhower used the power of the emergent "imperial presidency" to hold back what he considered reckless actions in the face of a cold war crisis.

During the 1950s, Dwight D. Eisenhower was widely seen as a presidential figure-head who depended on his staff for policy direction and day-to-day decision making. Today, it is scarcely news to scholars that Eisenhower was in fact very much the architect and principal constructor of the policies and actions of his administration.[2] In Dwight Eisenhower the United States had a president who was far more politically shrewd and able than was evident to most of his contemporaries. And he was as much a geopolitical strategist as a politician. As a two-term cold war president, Eisenhower brought a remarkably unified, and, in the judgment of latter-day analysts, coherent strategic stance to his conduct of national security.[3]

Space policy during the 1950s provides an ideal case study

of the strengths and weaknesses of Eisenhower's leadership style as it has come to be known in the years since reexamination of his presidency became an intellectual growth stock. It is an excellent example of how initial negative assessments of Eisenhower's actions have been modified or abandoned with the passage of time and the declassification of new information. It provides, also, a fascinating contrast with the direction space policy was to take under Eisenhower's successors.

The hallmark of Eisenhower's handling of space policy was his stolid resistance to demands that the United States embark on crash programs to compete with the Soviet Union. To understand this measured approach, it is instructive to consider certain of the individual qualities of the man, as well as the broad strategic stance of his administration and the state of U.S. space policy prior to Sputnik. This sets the stage for a detailed examination of the policies and actions of the Eisenhower administration following the Soviet space launching of 4 October 1957. That event was Pearl Harbor-like in the extent to which it galvanized the American people and their leaders, leading to a fundamental redirection of the nation's policies and priorities.

This chapter will focus on Eisenhower himself and the distinct imprint his own vision of national security issues placed on space policy in the 1950s. In so focussing it is necessarily selective, building on the work of other scholars who have shown the complex interplay of political and military

considerations and the intense bureaucratic and partisan maneuvering that characterized space policy in the Eisenhower years. As the statement by Eisenhower that serves as the epigraph of this chapter suggests, the politics of space in the 1950s was in many ways subordinate to the politics of military missile development. The concern here, however, is not mainly with missile policy and the missile-gap controversy, but with space policy and the space-gap controversy that parallel the missile-gap controversy.[4]

Although the story of Eisenhower and space policy unfolds for the most part in the 1950s, Eisenhower lived on through the first months of the Nixon presidency, remaining alert and preoccupied with contemporary affairs almost to his dying day. His views from the side-lines, which we consider in our conclusion, are of interest not only for their own sake but also for the insight they shed on counter-factual questions about how space policy might have unfolded had Eisenhower's policies been continued into the 1960s.

Space Policy Before Sputnik

A starting point for any discussion of space policy in the 1950s must be a recognition of how intimately linked this issue was with broader national security concerns. Both before and after Sputnik, the prevalent view among U.S. government officials was that space represented a challenging new forum for cold war competition. Eisenhower, more than any public figure of the time, resisted this notion. To understand from whence this

resistance sprang, it is necessary to understand Eisenhower's views on national security.

Eisenhower's National Security Philosophy

Dwight Eisenhower entered the White House with a more fully articulated view of national security policy than any president before or since. His interest in the broad questions of security and strategy went back to his tutelage under the legendary military intellectual General Fox Conner in the early 1920s. Ike had served as supreme commander in Europe during World War II and Army chief of staff and supreme allied commander (SAUCER) of NATO forces in the post-war period. Eisenhower had more than just a professional's factual knowledge in the defense area; his firm convictions about domestic as well as foreign policy, and the relationship between them, comprised a full-fledged philosophy of national security. "Spiritual force, multiplied by economic force, is roughly equal to security," Eisenhower wrote to Lucius Clay in 1952. "If one of these factors falls to zero, or near zero, the resulting product does likewise."[5]

On domestic policy, Eisenhower was a free-market conservative. He believed that big government and high taxes were the great enemies of prosperity. As he constantly reminded those around him, one of his chief missions at the White House was to contain the growth of government expenditures. Eisenhower fervently believed that budgets should be balanced and frequently warned about the perilous consequences of not achieving this goal.[6] He adamantly resisted the view of economists like the

former chairman of President Truman's Council of Economic Advisers, Leon Keyserling, who held that higher government spending could stimulate the economy and thus generate new revenues that made up for any deficits. During a 1955 press conference Eisenhower commented that he had read that "Mr. Keyserling has a plan for spending a good many more billion dollars, for reducing taxes, and balancing the budget at the same time. That, I would doubt, was a good economic plan."[7]

This conservatism, along with a strategic doctrine that rejected the need for overkill, would have a direct impact on Eisenhower's thinking about the defense budget. "How to balance essential security needs with maximum economic strength was the great equation that Eisenhower strove to solve," Ivan Morgan has written.[8] In his first message to Congress, Eisenhower warned that boosting military strength "without regard to our economic capacity would be to defend ourselves against one kind of disaster by inviting another." On April 30, 1953, Eisenhower was told that the National Security Council (NSC) that the United States faced two fundamental threats: the external Soviet menace and the internal danger that the costs of defending the free world "may seriously weaken the economy of the United States and thus destroy the very freedom, values and institutions which we are seeking to maintain."[9]

This message would be a centerpiece of Eisenhower's national security thinking, preached to both the public and his own advisors. "Again and again I reiterated my philosophy on the

defense budget: Excessive spending causes deficits, which causes inflation," Eisenhower wrote in his memoirs. "Every addition to defense spending does not automatically increase military security. Because security is based upon moral and economic, as well as purely military strength, a point can be reached at which additional funds for arms, far from bolstering security, weaken it."[10]

Beyond his fear of the economic consequences of excessive federal spending, Eisenhower had a Republican distrust of government. He worried that larger government could undermine democracy by producing a bureaucratic monolith which was accountable to no one. As time passed, Eisenhower became particularly concerned about the growing influence of military and scientific elites. He would voice this concern most strongly, of course, in his farewell address when he warned against the "acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex."[11] But there is evidence that Eisenhower harbored these concerns from early on in his White House tenure.

In assembling his cabinet, Eisenhower turned to people who shared his concern about the overall damage to America's position that could be wrought by high government spending. Eisenhower's closest economic advisor, Secretary of the Treasury George M. Humphrey, was a strong believer in restrained government spending, lower taxes, and balanced budgets. "Humphrey's fiscal views reflected his conviction that many government activities

were wasteful, unnecessary and the harbinger of socialistic collectivism," Morgan observed. Humphrey was an especially harsh critic of defense spending, saying at one point, in 1957, that "we're throwing away forty billion in capital every year--on the dump heap." It "serves only our security for that year, then on the dump heap.[12] Eisenhower's Secretary of State, John Foster Dulles, was apprehensive about overly zealous attempts to save money at the Pentagon, but generally adhered to the administration line. "If economic security goes down the drain, everything goes down the drain," Dulles warned.[13]

While Eisenhower saw economic peril in every budget increase, and worried about democracy's future in a technocratic world, he was less concerned than many of his contemporaries about the Soviet threat. As supreme commander of NATO forces, Eisenhower had pondered the Soviet threat on a daily basis. The experience seems to have left him less, not more, concerned about the prospect of bold Soviet aggression. In the White House, Eisenhower never put credence in the idea that the Soviets would mount an attack at the first sign of western weakness. On one occasion in 1953 he complained to his special assistant for national security affairs, Robert Cutler, that members of the National Security Council "worry so damn much about what we'll do when the Russians attack. . . . Well, I don't believe for a second they will ever attack."[14] On another occasion, in 1956, Eisenhower commented in a letter to Field Marshal Bernard Law Montgomery about Soviet intentions: "These Communists are not

early Christian martyrs. The men in the Kremlin are avid for power and are ruthlessly ambitious. I cannot see them starting a war merely for the opportunity that such a conflict might offer their successors to spread their doctrine."[15]

During the late 1950s, a time that some strategic thinkers like Albert Wohlstetter and Paul H. Nitze advertised as a period of "maximum danger," Eisenhower remained confident about the U.S. security position. James P. Killian, Jr., Eisenhower's first science advisor, remembers the President getting up from the chair in his office, looking out the window, and talking about his own experience as a general. Eisenhower said that he hoped his advisors recognized that he had some measure of judgment in this field, and that he didn't see any possibility of hostilities with the Soviet Union. Killian also recalls Eisenhower telling him he was not himself "anticipating or expecting any shooting war with the Soviet Union for the next five years."[16]

Beyond his conviction that the Soviets would not risk initiating war in the nuclear age, Eisenhower firmly believed that the West as a whole was distinctly stronger than the communist world and would remain so given its superior economic performance. In 1951, when top Truman administration officials were warning of the West's disintegrating position vis-a-vis the Soviet Union, Eisenhower stated: "We must not forget that in total wealth, material strength, technical scientific achievement, productive capacity, and in rapid access to most of the raw materials of the world, we, the free nations, are vastly

superior to the communist bloc."[17] Eisenhower repeated this idea often during his presidency, and would reiterate it with particular frequency following the Soviet launch of Sputnik. His clear message was that quantitative analyses of military hardware conveyed only part of the story--and a very small part at that--about America's security situation.

The "New Look" and Early Space Policy

The Eisenhower administration's economizing approach to national security was exemplified by its "New Look" defense policy. The "New Look" rejected the highly ambitious approach to defense that had been embraced by the Truman administration and articulated in the 1950 cold war planning document, NSC 68. In a speech before the Council on Foreign Relations in January 1954, John Foster Dulles enunciated the Eisenhower administration's objections to the Truman strategy, saying it could not have been sustained for long "without grave budgetary, economic, and social consequences."[18]

In concrete terms, the "New Look" translated into a greater emphasis on nuclear weapons for defense and reduced spending for conventional forces. The overall effect of the policy was to rein in the growth of defense spending. In fiscal year (FY) 1954, defense expenditures constituted 65.7 percent of the federal budget and 12.8 percent of the Gross National Product (GNP.) By FY 1961, such expenditures had dropped to 48.5 percent of the budget and 9.1 percent of the GNP.[19]

In the crisis following Sputnik, critics of the Eisenhower

administration would charge that his "New Look" program of austerity had served to undermine both ballistic missile research and the development of a U.S. satellite. Through unimaginative leadership and penurious policies, it was charged, Eisenhower had left the United States at a distinct disadvantage in the opening round of the space race.

The notion that space was a sphere for international competition pre-dated the Eisenhower presidency. As early as 1946, some experts had warned about the negative consequences of falling behind in the space race. A RAND report written in that year suggested that the nation which first put a satellite into space would be seen as militarily and scientifically superior. It predicted massive consternation if the U.S. found that another nation had beat it out in putting up a satellite. A report commissioned by the Truman administration in 1952 echoed this finding, arguing that a Soviet advantage in satellites would be a serious blow to U.S. scientific prestige and would be milked by Soviet propagandists for all it was worth.[20]

Eisenhower was ambivalent about the issue of prestige in the cold war. Prestige was a relatively minor factor in his broad-based conception of western strength and the nature of cold war competition, but he was intensely interested in propaganda and psychological warfare. Believing that psychological warfare was a cost-effective way to score cold war gains, Eisenhower placed an emphasis on it from the earliest days of his administration, devoting both personal attention and budgetary

resources to bolstering America's propaganda activities abroad. Psychological warfare was discussed at Eisenhower's first cabinet meeting on January 23, 1953. Within his first year in office, Eisenhower had reorganized the U.S. propaganda apparatus, creating a new Operations Coordinating Board (OCB) which had psychological warfare as one of its missions and which would eventually involve itself heavily in U.S. space activities.[21]

In 1954, U.S. space policy began to take shape with planning for the International Geophysical Year, which was scheduled to go from July 1, 1957 to December 31, 1958. During that year, Wernher von Braun of the Army Ballistic Missile Agency wrote a report in which he argued that putting a satellite into space was eminently feasible. Braun argued that since this goal could be realized by the U.S. in only a few years with available technology "it is only logical to assume that other countries could do the same. It would be a blow to U.S. prestige if we did not do it first."[22]

Von Braun's view was echoed the following year in NSC 5520, a government directive on space policy that was approved on May 20, 1955. The document recognized the feasibility of orbiting a civilian satellite and stated that "Considerable prestige and psychological benefits will accrue to the nation which first is successful in launching a satellite. The inference of such a demonstration of advanced technology and its unmistakable relationship to intercontinental ballistic missile technology might have important repercussions on the political determination

of free world countries to resist communist threats, especially if the USSR were to be the first to establish a satellite."[23]

Nelson A. Rockefeller, at this time the Special Assistant to the President on Government Operations and vice chairman of the OCB, circulated NSC 5520 through the government with a cover memo of his own. The successful launching of a satellite, he wrote, will "symbolize scientific and technological advancement to peoples everywhere. The stake of prestige that is involved makes this a race that we cannot afford to lose."[24]

With the approval of NSC 5520, the U.S. civilian satellite program, Project Vanguard, was officially born. However, this enterprise was not conducted with the urgency that Rockefeller's warning might have warranted. Prestige had been only one of four main reasons listed in NSC 5520 for developing a civilian satellite; it was not put forth as the chief motivating factor. Just as important were military research considerations and the desire to establish a legal precedent during the IGY for satellite overflight of foreign countries, along with a drive toward scientific achievement.

In short, during this initial, pre-Sputnik stage of the U.S. space program, there was no consensus in the United States government for waging an outright competition with the Soviet Union to reap the psychological dividends of being first into space with a civilian satellite launch. Eisenhower himself seems have been unconcerned with winning such a competition in 1955 and 1956. At an NSC meeting on May 3, 1956, where the escalating

cost of Vanguard was discussed, Eisenhower acknowledged that he had never been very enthusiastic about the satellite program. He rejected suggestions by Treasury Secretary Humphrey that the program be cancelled on economy grounds but said that the priority assigned to Vanguard should be below that of more urgent Pentagon programs. Eisenhower's stance, as summarized in the minutes of the May 3 meeting, was that the U.S. should continue its program to launch a satellite with the understanding that the program "will not be allowed to interfere with the ICBM and IRBM programs but will be given sufficient priority by the Department of Defense in relation to other weapons systems to achieve the objectives of NSC 5520."[25] In January 1957, Eisenhower was told that the first attempt at a satellite launch was scheduled for October 31, 1957. He did not object to this timetable. As Eisenhower later wrote in his memoirs: "Since no obvious requirement for a crash satellite program was apparent, there was no reason for interfering with the scientists and their projected time schedule.[26]

If Eisenhower was relatively unconcerned about losing a prestige race in space, he was by no means complacent when it came to the military applications of missile technology and the intelligence potentiality of satellites. In the summer of 1954, Eisenhower asked MIT President James Killian to head a commission to examine current trends in the military competition with the Soviet Union and to evaluate the threat of surprise attack. The recommendations of Killian's Technological Capabilities Panel

(TCP), put forth in February 1955, would have an important impact on U.S. space policy over the next several years. First, and most importantly, the TCP recommended that the Air Force program for ICBM development be given the highest priority. Eisenhower approved this recommendation, and as Killian would later write, this was the "first time such a priority had been given in peacetime."[27] With a special "missile czar," assistant secretary of defense Donald Quarles who coordinated the effort in the Pentagon, the U.S. missile program was essentially run on a crash basis through the rest of the decade. As Eisenhower would later recall in his memoir, "To these programs we devoted all the resources that they could usefully absorb at any given time."[28]

The effect of this priority status for military missiles, however, was to delay the U.S. civilian satellite project. As Killian would observe, Vanguard's development was "handicapped by the National Security Council Directive that gave the development of our military missiles top priority with the result that many able engineers working on Vanguard were diverted to ICBM programs."[29] In the wake of Sputnik, the Eisenhower Administration would defend itself by observing that the U.S. could have put a satellite in orbit before the Soviets, but such an effort would have hurt top priority missiles programs. Vanguard has "not had equal priority with that accorded our ballistic missile work," said a White House statement released shortly after the Soviet launch. "Speed of progress in the satellite project cannot be taken as an index of our progress in

ballistic missile work."[30]

Another result of the Technological Capabilities Panel was to draw attention to the need for better U.S. intelligence capabilities. "We must find ways to increase the number of hard facts upon which our intelligence estimates are based, to provide better strategic warning, to minimize surprise in the kind of attack, and to reduce the danger of gross overestimation or gross underestimation of the threat," said the report.[31] This recommendation echoed a 1954 RAND Corporation report which argued that developing a satellite reconnaissance vehicle was of vital importance. On March 16, 1955, the Air Force took an initial step toward this goal when it called for proposals from industry to create a U.S. spy satellite. This project, too, would take precedence over the civilian science satellite.

The first U.S. reconnaissance satellite would not be operational until 1960. In the meantime, starting in June 1956, the United States relied on the U-2 spy plane program to gather intelligence on Soviet military capabilities.[32] Over the next several years, U-2 flights would reveal that the Soviet missile program was proceeding extremely slowly. In part, it was Eisenhower's access to this information that explained his confident outlook during the furor which followed the Soviet Sputnik launch.

In his classic history of the space age, Walter McDougall succinctly summarized the complicated history of U.S. space policy during the first half of the 1950s:

> Occupied by the need to keep abreast of the USSR in long-range rocketry, the Eisenhower administration put the ICBM on a crash basis. Absorbed by the need to monitor Soviet R & D and deployment whether arms race or arms control obtained, it also gave priority to the USAF spy satellite program, two and one-half years before the Space Age opened. Worried about the legal and political delicacy of satellite overflight, it seized the IGY opportunity to initiate an unobtrusive scientific satellite program under civilian auspices. Finally, the administration was advised of the propagandistic value of being first into space. Of all these critical areas, however, the last had the lowest priority.[33]

With more generous funding there is no reason why the United States could not have pursued all three of its main space programs on a top priority basis. However, to accept a case for such funding Eisenhower would not only have had to suspend his perpetual resistance to higher defense spending, but also to have become convinced that the warnings about the danger to U.S. prestige by a Soviet first in space had sufficient merit to warrant a more costly American space program.

Such warnings never resonated strongly with Eisenhower. Still, it would be wrong to conclude that he never worried about losing the race to put a civilian satellite into space. Slightly under five months before the launching of Sputnik, at a May 10, 1957 meeting of the NSC, Eisenhower expressed concern that

efforts to make the Vanguard satellite more scientifically sophisticated would delay the program. Such costly instrumentation had not been envisaged when NSC 5520 had originally been approved, Eisenhower said. He stressed that "the element of national prestige, so strongly emphasized in NSC 5520, depended on getting a satellite into orbit, and not on the instrumentation of the scientific satellite."[34]

These concerns were expressed too late to change the course of the program. And in June, after statements by Soviet scientists that the Soviet Union would soon launch a satellite, the OCB began preparing the Eisenhower administration's response to losing the first round of the space race. Central to that response, agreed members of an OCB working group, should be a disclaimer by the United States that it ever had any intention of engaging in a race with the Soviets to launch the first civilian satellite.[35]

Sputnik: Its Impact and Immediate Aftermath

The Soviet launch of Sputnik touched off one of the most serious crises of Eisenhower's presidency. Like no other previous event, it cast doubt on his capacity for decisive presidential leadership and undermined his strongest asset: a reputation for sound judgment in the national security field.[36] Eisenhower responded to the Soviet challenge with confidence and steadiness, but these personal characteristics were at once an asset and a handicap. On the one hand, a more insecure president could have overreacted to the Sputnik crisis, authorizing

unproductive crash programs to counter the Soviet move or making belligerent pronouncements about America's determination to win the space race. Responses like these could have heightened cold war tensions. On the other hand, Eisenhower appears not to have appreciated just how panicked Americans were or to have recognized the degree to which space could become politicized. To some extent, this seeming complacency reflected Eisenhower's mistrust of rhetoric and his insufficient appreciation for the symbolic importance of policy. To a greater extent, it reflected his confidence in America's security position.

In the aftermath of the Soviet launch, Eisenhower sought to contain a number of consequences which he found distressing: the perception among both the public and certain elites of a new sense of military vulnerability, which contrasted sharply with Eisenhower's own outlook; the widespread tendency to see space as a new arena of cold war competition, which Eisenhower believed was misguided; and the rapid manner in which space policy became politicized by Democrats who found the alleged space and missile gaps perfect issues for attacking the Eisenhower administration without personally attacking the popular president.

The Immediate Impact of Sputnik

News of the Soviet launch of Sputnik on October 4, 1957, stunned Washington and the nation. In the tense climate of cold war competition even minor jolts to the politico-military equilibrium could be nerve wracking. But Sputnik was a decidedly major jolt. It appeared to signal both a broad Soviet

technological superiority, and, more ominously, a specific Soviet advantage in ballistic missiles. Sputnik was the greatest propaganda coup of the cold war and it triggered a torrent of alarmed comment. Senator Henry Jackson called Sputnik "a devastating blow to the prestige of the United States as the leader of the free world."[37] Senator Lyndon Johnson and others compared the Soviet satellite launch to Pearl Harbor.[38] Newspaper editorials around the country warned of America's eroding position vis-a-vis the Soviet Union.

In the next few months, with the Soviet launch of a second, far more impressive Sputnik satellite in early November, and the highly publicized explosion on the launching pad of America's Vanguard satellite in December, Eisenhower would face unrelenting criticism on the space issue. Even though the United States succeeded in launching its own satellite in January 1958 and rapidly organized an impressive space program, the perception of a lagging U.S. space effort would dog Eisenhower for the rest of his time in office. The space-gap issue, moreover, would remain hopelessly intertwined with fears of U.S. military vulnerability, fueled in 1958-60 by increasingly strident allegations that the United States was yielding the advantage in the cold war.

While Eisenhower and his top advisors were caught unprepared for the extraordinary national and international uproar that followed Sputnik, they were not altogether surprised that the Soviets had managed to launch a satellite. The U-2 spy plane had taken photos of the SS-6 missile on which Sputnik would be

launched, and U.S. intelligence had told Eisenhower in November 1956 that the Soviets would be able to launch a satellite within a year. As William Burrows observed: "by the time Sputnik went into orbit on October 4, the United States knew quite a bit about the missile that carried it there."[39] Apparently U.S. intelligence was not entirely comprehensive, for in his memoirs Eisenhower writes that he and others were taken back by the weight of the Soviet satellite, 184 pounds. "The size of the thrust required to propel a satellite of this weight came as a distinct surprise to us."[40]

What startled Eisenhower far more than the advance in Soviet rocketry was the intensity of public concern.[41] Sputnik was not true proof of a Soviet advantage in ICBM development, but it appeared to be, and this idea was terrifying to many in the United States. Killian, who would be appointed White House science advisor in November 1957, captured the furor of the moment in his memoir: "As it beeped in the sky, Sputnik I created a crisis of confidence that swept the country like a windblown forest fire. Overnight there developed a widespread fear that the country lay at the mercy of the Russian military machine and that our government and its military arm had abruptly lost the power to defend the homeland itself, much less to maintain U.S. prestige and leadership in the international arena. Confidence in American science, technology, and education suddenly evaporated."[42]

If Eisenhower was indeed out of touch with this national

panic, part of the reason undoubtedly was his own lack of alarm. As James Killian would write: "With his full knowledge of our military programs, especially our progress in missile and military satellite technology, and our national intelligence estimates, he found it hard to understand the national dismay and fear. He was startled that the American people were so psychologically vulnerable."[43] Because he believed America remained secure, Eisenhower did not think that Sputnik necessitated sweeping changes in national policy. He acknowledged the need, as he recalled later, for the United States to "take all feasible measures to accelerate missile and satellite programs."[44] Yet for the most part he felt his chief problem was a political one--that of convincing the American people that all was well and that their nation remained not only secure, but actually superior to the Soviet Union in overall strength.

Eisenhower's way of tackling this challenge was to seek to educate the public about the facts of national security as he saw them. Although Eisenhower has been criticized by historians for his failure to appreciate the power of the bully pulpit, his public relations effort following Sputnik was quite vigorous. It was sustained over time and hewed to a consistent message. In his October 9 press conference, Eisenhower said that the Sputnik launch did not raise his apprehension "one iota. I see nothing at this moment, at this stage of development, that is significant in that development as far as security is concerned."[45]

Eisenhower observed that the Soviet Union had still not substantiated its claim that it possessed an accurate, operational ICBM. Other administration officials echoed this reassuring theme. In a speech in San Francisco on October 15, Vice President Richard Nixon said that "militarily, the Soviet Union is not one bit stronger today than it was before Sputnik was launched." He said that the free world "remains stronger than the Communist world" and could "meet and defeat any potential enemy."[46] In remarks to the press, John Foster Dulles made the same point a day later.

But the administration was fighting an uphill battle in the face of the all-too-visible evidence of Soviet achievements, including the more impressive Sputnik II, which was launched on November 3, 1957 with a 1,121-pound payload, including a dog. Sputnik II not only underscored the power of Soviet missile boosters, but also provided evidence that the Soviets were already striving toward manned spaceflight.

Eisenhower's most substantial effort to quell the near-hysteria which followed the Sputnik launches came in a major television and radio address on November 7. Again, Eisenhower assured the public that America's nuclear arsenal was adequate to deter any threat from the Soviet Union. He could not, of course, reveal to the public the intelligence he was receiving from U-2 flights over the Soviet Union--data which showed the Soviet missile program to still be in a state of infancy. But there were many other reassuring points he could and did convey.

Eisenhower explained the elaborate warning system the United States had to protect against any surprise attack and talked about how dispersal of the U.S. strategic arsenal made it invulnerable to a Soviet first strike. He acknowledged that the Soviets were likely ahead in some missile areas and in satellite technology but he assured his listeners that, overall, "We are well ahead of the Soviets in the nuclear field both in quantity and in quality. We intend to stay ahead."[47]

Paralleling Eisenhower's message that America was winning the arms race was his emphatic insistence that the United States was not engaged in a space race. Eisenhower had already made this point in his October 9 statement when he said that "The United States satellite program has been designed from its inception for maximum results in scientific research. . . . Our satellite program has never been conducted as a race with other nations."[48] During his November 7 speech, he stressed this point again. Over the next three years, he would continue to emphasize the non-competitive nature of the U.S. space program.

Eisenhower's effort to avoid a highly publicized space race was motivated not only by cost considerations and fear that the U.S. might lose such a race because of its late start, but more fundamentally by geopolitical considerations. Since the beginning of his administration, Eisenhower had sought to contain the competition with the Soviet Union. He believed that the cold war struggle represented a colossal waste of human resources. He also believed, as noted earlier, that the more intense that

struggle became, the more America's democratic institutions and way of life would be threatened.

To Race or Not to Race: Eisenhower Deliberates

Even as he publicly dismissed the notion of a space race, Eisenhower privately expressed concerns about the prestige and propaganda dimensions of space policy. At a meeting on October 8, 1957, with scientific and military advisors, he agreed with a suggestion that the Defense Department consider using the Jupiter-C missile as a back-up to Vanguard to insure that U.S. efforts to get a satellite into space as soon as possible did not fail. Later in October the Pentagon officially began planning for a Jupiter launch in early 1958.[49]

At a National Security Council Meeting on October 10, Eisenhower was briefed on the Vanguard project and told that the U.S. satellite would orbit at a lower height than Sputnik. Eisenhower's response was to question whether such a lower orbit might affect U.S. prestige. Later at the same meeting, according to the minutes, "the President stressed once again the great political and psychological advantage of the first achievement of an IRBM and an ICBM. He noted that from the inception of the ballistic missile program the Council had agreed that these political and psychological considerations were perhaps even more important than the strictly military considerations."[50]

The tension between Eisenhower's conviction that space exploration should not be the subject of international competition and his realization that it inevitably was marked his

thinking throughout his presidency and on into retirement. He mused in a January 1958 meeting with his party's congressional leaders on the irony that "we should undertake something in good faith only to get behind the eight-ball in a contest which we never considered a contest."[51] In 1965, he explained to a letter writer that "Under no circumstances did we want to make the thing a competition, because a race always implies urgency and spectacular progress regardless of cost. . . . Neither then nor since have I ever agreed that it was wise to base any of these projects on an openly and announced competition with any other country. This kind of thing is unnecessary, wasteful and violates the basic tenets of common sense." Yet in the same letter Eisenhower commented that "manifestly we did not want to be second in the field."[52]

Eisenhower's concern about prevailing in the ostensible non-space race would grow greater over time, but he would continue to confine expressions of such concern to private meetings. By 1959, Eisenhower was dwelling frequently on the need for the United States to speed up its development of a large booster missile, or super-booster, which he saw as having tremendous psychological significance.[53] And while publicly Eisenhower continued to emphasize that increased scientific knowledge was the main goal of the U.S. space program, privately he began to rank that goal last--behind the goals of national security and prestige. At a meeting with top advisors on October 21, 1959, for example, Eisenhower said that the space program

could be broken down into three goals. "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."[54]

By 1960, the aim of avoiding shame loomed large in Eisenhower's mind. Thus, at a January 12, 1960 NSC meeting he declared that the U.S. should seek to "achieve a psychological advantage for ourselves," adding that "we would have to eliminate" whatever discrepancy existed between the U.S. and the U.S.S.R. and "in certain instances would have to exceed Soviet accomplishments."[55]

Eisenhower continued to believe personally and stress publicly that American prestige was rooted most firmly in U.S. economic success, and that a crash space program to bolster America's image was neither necessary nor desirable. But clearly, between late 1957 and 1960 his views underwent an evolution. Two factors appear to have changed Eisenhower's thinking: first, the clear concern with prestige on the part of the Soviet leadership and second, the emergence of a strong consensus within the United States that success or failure in space policy was integral to the nation's world standing.

Khrushchev's frequent emphasis on the psychological

component of the cold war was impossible to ignore. Whatever Eisenhower's doubts, the Soviet leader manifestly believed that prestige mattered in the superpower rivalry, and he sought to gain maximum political leverage from Soviet gains in space. Even before the Sputnik launches, Khrushchev had exaggerated Soviet progress in developing ballistic missiles and touted Soviet science generally. His aim was to intimidate U.S. allies, to woo newly de-colonized developing countries by advertising the superiority of the communist economic system and (it is now known) to obscure major Soviet military weakness.

After the Sputnik launchings, Khrushchev stepped up his propaganda effort, boasting about the devastation that could be wrought in Western Europe by Soviet nuclear strikes and citing the Soviet satellites as proof of the Soviet Union's scientific prowess. Eisenhower may not have been easily shaken by such posturing, but from the first days of the Sputnik crisis many of his advisors showed intense concern about the propaganda implications of space exploration. At the NSC meeting on October 10, 1957, CIA Director Allen Dulles commented that Khrushchev "had moved all of his propaganda guns in place. The launching of an earth satellite was one of a trilogy of propaganda moves, the other two being the announcement of a successful testing of an ICBM and the recent test of a large-scale hydrogen bomb at Novaya Zemlya." Dulles claimed that the Soviet propaganda offensive was aimed at creating maximum leverage in the Middle East and, more generally, at demonstrating the effectiveness of the Communist

system to the underdeveloped countries. In Dulles' view, the campaign was "exerting a very wide and deep impact."[56]

Other U.S. officials shared this view. At the same meeting, Under Secretary of State Christian Herter described the overseas reactions to Sputnik as "pretty somber," and argued that the United States "will have to do a great deal to counteract them and, particularly, to confirm the existence of our own real military and scientific strength." Arthur Larson, head of the United States Information Agency, echoed this point, saying that "If we lose repeatedly to the Russians as we have lost with the earth satellite, the accumulated damage would be tremendous." Larson insisted that the United States must be first in achieving the next big breakthrough in space.[57]

In the immediate aftermath of the Sputnik launches, U.S. officials were unsure about the international ramifications of the Soviet achievements in space. The State Department and CIA received a flood of reports of reactions from around the world, and sorting through this information took time. On November 14, Gordon Arneson, the Deputy Director of Intelligence and Research at the State Department, summed up the preliminary view of some U.S. analysts regarding these reactions in a memorandum to Secretary Dulles. "The USSR's prestige has risen substantially and the U.S. has suffered a serious, although not decisive, setback," Arneson wrote. "World opinion tends to hold that the sputniks per se have not altered the strategic balance of forces in the short run, since Soviet ICBMs are not yet thought to be in

mass production. Nevertheless, some new weight has been lent to Soviet foreign policy pronouncements and increased credibility may attach to Soviet claims in other fields." Arneson saw few immediate consequences of this new credibility, but went on to express a view that was quickly becoming conventional wisdom within the Eisenhower administration: "Delayed or insufficient demonstration of United States success in the ballistic field would produce political and psychological effects of substantially more serious nature--for example, on attitudes toward neutralism and on the cohesion of alliances.[58]

Outside of the Eisenhower administration there was a widespread belief that the Sputnik launches had pushed the cold war rivalry into a new arena. In hearings held in Congress in late 1957, a parade of expert witnesses echoed the judgment of Dr. Vannevar Bush, who commented that "In the scientific field we must recognize that we are in a tough competitive race with the Russians and have a lot of good tough work to do."[59] Even at this early stage, there was talk of which superpower would get to the Moon first.

In February 1958, the RAND Corporation produced a report which analyzed the political implications of the space age. The report argued that the developments in space could have far-reaching implications. It would "be folly to deny that the allies' estimates of the balance of power in the future are based in part on the expectation that Western science and technology will maintain a decisive lead over the Soviet bloc." Such

perceptions were closely linked to space exploration and competition in this field had to be managed with an eye to propaganda gains. "From now on, the U.S. should recognize the need for restoring credibility in U.S. superiority, stress our peaceful intentions and their aggressive ones, and disclose and publicize U.S. outer space activities according, first and foremost, to the effect on the U.S. international position."[60]

Also in February, Eisenhower's science advisory committee produced a paper on space policy which said that "The psychological impact of the Russian satellites suggests that the U.S. cannot afford to have a dangerous rival outdo it in a field which has so firmly caught, and is likely to hold, the imagination of the world."[61] This conclusion was reflected in a document approved by Eisenhower in August, NSC 5814/1, "Preliminary U.S. Policy on Outer Space."[62] Less than two years later, another official space policy document, NSC 5918, "U.S. Policy on Outer Space," would call for an unequivocal U.S. victory in space. It would say that failure to catch up with the Soviets might give rise to the idea that the U.S. was now "second best." A chief U.S. objective, therefore, should be "to achieve and demonstrate an overall superiority in outer space without necessarily requiring U.S. superiority in every phase of space activity."[63]

Still, the public face of U.S. space policy would remain non-competitive. A widely disseminated 1958 White House statement on space, "Introduction to Outer Space," did state that

to be strong in space technology "will enhance the prestige of the United States among the peoples of the world and create added confidence in our scientific, technological, industrial, and military strength." But the statement as a whole paid almost no attention to the competitive aspects of space exploration, dwelling instead on the scientific wonders of venturing beyond the earth's atmosphere.[64]

In the final analysis, while Eisenhower did come to worry more about the connection between prestige and space policy as time passed, he and his closest advisors on space would remain ambivalent on this point. T. Keith Glennan recalls, for example, that during the private meeting in which Eisenhower offered him the top NASA job in August 1958, he "made no mention of any great concern over the accomplishments of the Soviet Union although it was clear that he was concerned about the nature and quality of scientific and technological progress in this country."[65] In a 1959 memorandum to Eisenhower, Glennan wrote: "Personally, I do not believe we can avoid competition in this field. . . . But I do believe that we can and should establish the terms on which we are competing. We could thus place the 'space race' in proper perspective with all the other activities in the competition between the US and USSR."[66]

James Killian, probably Eisenhower's most influential advisor on space policy, also believed the U.S. should walk this fine line. As he said shortly after leaving the White House: "I believe that in space exploration, as in all other fields that we

choose to go into, we must never be content to be second best, but I do not believe that this requires us to engage in a prestige race with the Soviets. We should choose our own objectives in space science and exploration and not let the Soviets choose them for us by copying what they do. . . . In the long run we can weaken our science and technology and lower our international prestige by frantically indulging in unnecessary competition and prestige-motivated projects."[67] As longtime Eisenhower aide General Andrew Goodpaster would recall, Eisenhower shared such views. "The President's approach was if we're doing the right thing in about the right way we'll let the prestige work itself out."[68]

The Domestic Politics of Space

Besides trying to head off an outright race, Eisenhower sought to quell the partisan bickering which surrounded space policy after Sputnik. This, too, would prove difficult and Eisenhower would be subject to more criticism on missile and space policy than in nearly any other area during the course of his presidency. Leading the attack were Democrats in Congress who hoped to improve their party's prospects in the 1960 presidential election. The Democrats suggested that American inferiority vis-a-vis the Soviet Union in missile and space policy underscored a broader failure by Eisenhower and other Republican leaders to provide sound national leadership.[69] Indeed, the putative space and missile gaps became part and parcel of the larger Democratic stance in the 1960 presidential

campaign, and the urgency of revising such deficiencies was central to much of Kennedy's more inspirational rhetoric.

It is testimony to Eisenhower's discomfort about politicizing national security policy that he refused to try to exculpate himself by blaming the Truman Administration for its slow pace in missile development. While Eisenhower hinted in some of his speeches that Truman was to blame for America's late start in space, and would make this point explicitly during the 1958 Congressional campaign, he did not fully express his true feelings on this point until he published his memoirs in the early 1960s. In Waging Peace, Eisenhower quoted his 1947 remark as Army chief of staff that a neglect of research on guided missiles "could bring our country to ruin and defeat in an appallingly few hours." He then noted that in the seven years between fiscal years 1947 and 1953, the United States programmed less than seven million dollars for long-range ballistic missiles. On two separate occasions the executive branch failed to spend money which Congress had appropriated to the Air Force for this purpose. Eisenhower recalled that once in the White House he immediately set out to reverse this pattern of neglect.

Another point that Eisenhower made in his memoirs but did not stress while president was his view that the Democratically controlled Congress shared much of the blame for deficiencies in U.S. space policy. He argued that Congress had slowed down Vanguard in the first half of 1957 by interfering with Pentagon efforts to use emergency funds for the project. In addition,

Eisenhower expressed annoyance at members of Congress who had threatened to reduce the Defense Department budget by $2 billion.[70] All of these arguments could have been made by Eisenhower while he was in office in response to the criticism that was heaped on him after Sputnik, but only at the cost of further politicizing space policy and undercutting his own opposition to a crash space program.[71]

The Sputnik crisis, along with the recession that had begun in August 1957, ushered in a period in which Eisenhower was no longer invulnerable to criticism. Between January and November 1957 his popularity plummeted from 79 percent approval to 57 percent approval in the Gallup poll.[72] Eisenhower's mild stroke in late November did not help matters. "The long honeymoon was over," wrote Robert Divine. "For five years Eisenhower had presided over a period of peace and prosperity, basking in public gratitude for ending the Korean war and letting the nation enjoy a great material abundance. Now he suddenly had to convince a skeptical nation that he understood the new problems facing the country but that he possessed the energy and vision needed to restore the United States to its accustomed position of world primacy.[73]

The Unfolding of Space Policy: 1958-1961

Following the Sputnik launches, there was little question that the United States would pursue a stepped up program for space exploration. Space was a frontier that could not be ignored, and perhaps more widespread than the feeling of fear

among the American public in the wake of Sputnik, was an intense curiosity about space. The sale of books and magazines that dealt with space and rockets soared, as did membership in clubs and associations in these areas. Eisenhower himself was intrigued. He may have been against a space race, but he was not against space exploration in principle. Even as a general, well before the missile age, Eisenhower had expressed his belief in the likelihood of future space travel. In 1955, Eisenhower had been so fascinated by a Walt Disney television feature on man in space that he had called Disney personally to borrow a film of the show so he could run it for top officials in the Pentagon.[74]

Eisenhower was no space buff, but his science advisor James Killian, for one, felt that the president definitely had a strong personal interest in space exploration.[75] Killian saw this interest as rooted in a broader appreciation that Eisenhower had for the importance of science. Killian went so far as to compare Eisenhower to Thomas Jefferson, suggesting that there was "an interesting parallel between Jefferson's scientific interests and Eisenhower's intellectual hospitality to those he called 'my scientists,' and to scientific and technological matters."[76]

Beyond the basic certainty that America would have a larger space program after Sputnik, there was substantial uncertainty in late 1957 and early 1958 about exactly what the goals of this program would be, how it would be organized, and the amount of money it would cost. Eisenhower resolved this uncertainty by seeing to it that the early space program was relatively modest,

that it would be clearly separated from the military drive to develop ballistic missiles and reconnaissance satellites, and that the organizational set-up for space exploration would be an independent civilian agency able to resist vested interests and military domination. Finally, Eisenhower's inevitable aim was to restrain spending on space, in keeping with his overall desire to check the growth of the federal budget.

Cartoonists of the time depicted Eisenhower as napping or golfing while the Soviets gained the advantage in space. But in truth, he was closely involved in mapping out a carefully circumscribed American agenda for space exploration.

Space and National Security Policy

After Sputnik's launch, the issues of space exploration and national security would be inextricably linked in the minds of many. Eisenhower faced pressures to increase defense spending in the wake of Sputnik from within the government as well as from the Democrats. The most intense pressure of this kind came from a body of national security experts that Eisenhower himself had convened, the Security Resources Panel--or Gaither Committee, so named for its chairman H. Rowan Gaither. The Gaither Committee had been set up in mid-1957 to analyze U.S. civil defense needs. It had soon broadened its mandate to include the entire gamut of strategic issues. Sputnik was launched as the committee was completing its work and helped to solidify the view of top members that the United States was fast falling behind in the arms race.[77] In particular, the Soviet launch seemed to add

weight to predictions made by such defense analysts as Albert Wohlstetter that the United States would soon be vulnerable to a preemptive Soviet nuclear strike. In its final form, presented to Eisenhower on November 7, 1957, the Gaither Report advocated a drastic step-up of U.S. military preparations.[78]

Eisenhower would reject most of the report's recommendations for new military spending; he believed that the committee's assessment of U.S. strategic vulnerability was greatly exaggerated. But politically, the timing of the report--the essence of which soon leaked to the press--could hardly have been worse. At precisely the moment that Eisenhower was seeking to reassure the American public that Sputnik had little significance, a group of respected experts had raised the specter of a widening missile gap. To many observers, the connection between the Soviet Union's new preeminence in space and America's endangered security appeared self-evident. And nowhere was the zeal for stressing this link greater than on Capital Hill, where Democratic members of Congress repeatedly invoked Soviet gains in space in calling for a major step-up of U.S. defense efforts. The successful launch of U.S. satellites by early 1958 did nothing to quiet administration critics.

Despite such pressures, Eisenhower held the line, rejecting the allegation that Soviet successes in space meant impending superiority in arms. Between FY 1958 and FY 1960, defense expenditures actually declined as a percentage of both the GNP and the federal budget.[79]

The Origins of NASA

At the same time that Eisenhower was determined to keep the issues of space and security politically separated, he was also committed to separating the areas organizationally. Initially, Eisenhower did not see the need for a separate agency for space exploration. At a February 4, 1958 meeting, James Killian told Eisenhower that many in Congress were pressing for some space work to be done outside of the Department of Defense. Eisenhower responded that he did not think that large operating activities should be put in another organization because of the duplication. He also worried that putting talent into crash programs outside of defense would undermine the higher priority missile programs. Eisenhower indicated that his condition for allowing the Department of Defense to continue handling space was that it "gets its own organization correct, i.e., that there is a central organization to handle this in Defense."[80]

Eisenhower's initial inclination to keep the space program as part of the Defense Department was consistent with his general desire to restrain the growth of government. Taking space out of the military's hands would mean creating a new bureaucracy, a prospect Eisenhower could not have relished. Eisenhower may also have hoped to avoid a fight with the Pentagon, which opposed the creation a separate agency for space exploration and had big plans for space-related undertakings. Whatever his initial reasoning, Eisenhower soon changed his mind and came to favor civilian control of space exploration. Explaining this shift in

his memoirs, he said that "Information acquired by purely scientific exploration could and should, I thought, be made available to all the world. But military research would naturally demand secrecy."[81] In effect, Eisenhower came to see that two space programs would be better than one: a vigorous military space program would receive top priority and spearhead America's missile and spy satellite programs; a civilian program would be the public face of American space exploration, undertaking those operations which had only propaganda or scientific value. Such a division of labor exists to this day.

The process by which Eisenhower handled the organizational aspects of space policy, establishing NASA, reflected his strong faith in his science advisors and his desire to rise above politics. By late 1957 intense competition was under way in Washington among various bureaucratic players for the control of space exploration. The two main contenders were the Department of Defense and the National Advisory Committee for Aeronautics (NACA), a research agency formed in 1915 at the dawn of the age of flight. The fight over space looked like it might be as messy as the battles over atomic energy in the late 1940s.[82]

Eisenhower approached this fray by stepping away from it and depoliticizing his decision to the greatest degree possible. He turned the problem of organizing a space program over to James Killian and the President's Science Advisory Committee (PSAC), asking in early February that it recommend the outlines of a space program and the organization to manage it.[83] Eisenhower's

decision on this point is characteristic of his hidden-hand approach to leadership. He knew well that Killian shared many of his views on science, space, and the cold war competition.

Killian had backed a civilian space agency since late 1957. And well before Eisenhower formally asked for a recommendation on space organization, PSAC's position was that an enlarged NACA should oversee civilian space missions. As Enid Curtis Bok Schoettle observed in an early investigation of NASA's birth: "PSAC, vocally representing the interests of the scientific community, sought a primarily civilian structure in which basic research and peaceful space missions could be pursued free from military control."[84] Later explaining his own enthusiasm for NACA, Killian wrote: "Here was a government scientific agency that was under the lay direction of some of the best civilian talent in the country, and the organization operated with freedom from political influence and unencumbered by government bureaucracy and red tape."[85] NACA itself was more than willing to take on the mission of space exploration, lobbying actively for the assignment. Thus, writes Schoettle, "by the end of January, the group of scientific advisers whom Eisenhower had charged with designing a space program and the agency's leadership were agreed that NACA would be the base on which NASA would be built."[86]

The idea quickly won widespread support inside the executive branch. On March 5, 1958, Eisenhower approved a memorandum ordering the Bureau of the Budget to draft a bill for Congress

which would turn NACA into NASA. The draft was completed by late March, and on March 27, Eisenhower said that "I expect to send up shortly recommended legislation providing for civilian control and direction of governmental activities incident to a civilian space program."[87] After intensive debate and tinkering, the bill establishing NASA was approved by Congress and signed into law on July 29, 1958.

In reflecting later on Eisenhower's relationship with his science advisors, Killian observed that the president "turned to our group repeatedly for advice when he felt that recommendations reaching him on military or other matters were colored by special interests."[88] The creation of NASA was the foremost example of Eisenhower's reliance on PSAC to sort out fiercely conflicting claims. "This whole undertaking is a vivid example of what can be accomplished by a group of advisers, freed by the president of bureaucratic controls and wearing the president's mantle," Killian states.[89]

At the February 4 meeting in which Eisenhower discussed the organization of the space program, he had said that he did not want to concern himself with the details of the problem.[90] By turning the matter over to PSAC, Eisenhower succeeded in this goal and there is no evidence that he anguished personally over how to organize space policy. While Killian felt he was caught in a "political hurricane,"[91] Eisenhower seems to have felt only a strong breeze. The episode was a classic example of Eisenhower's leadership style: he had gotten exactly the outcome

he wanted without appearing to engage in any outright political maneuvering.

Eisenhower's choice of T. Keith Glennan as first NASA administrator served further to point U.S. space policy in the direction the president preferred. As with Killian, Glennan--then head of Case Institute of Technology in Cleveland--was a highly respected and independent figure who happened to share Eisenhower's basic outlook toward science and space.

Glennan described his attitude toward his new job in an memoir he wrote after leaving NASA. First, he believed, like Eisenhower, that government was "growing too large" and that every effort should be made to avoid "excessive additions to the Federal payroll." Second, he was concerned that the United States proceed at the right pace--"orderly but aggressive"--in an area which was filled with technological uncertainty. Third, he shared Eisenhower's view that the prestige value of space exploration could not be ignored, but nor should the competition with Russia dictate America's space program. "In effect," said Glennan, "this meant that we must avoid the undertaking of particular shots, the purpose of which would be propagandistic rather than directed toward solid accomplishments in understanding the environment with which we are dealing."[92]

The Space Race Accelerates

Given the political pressures for an all-out space race with the Soviet Union, the degree to which Eisenhower controlled the

space policy agenda in the late 1950s stands as a considerable achievement. If Eisenhower had genuinely been the passive president that many of his contemporaries supposed, he would never have achieved such control, and instead found himself buffeted by public opinion, outmaneuvered by powerful congressional leaders, and manipulated by his own bureaucracy. Eisenhower suffered none of these fates in the area of space policy.

It would be inaccurate, however, to suggest that he ever was really in command of events. Eisenhower was correct in his claim that under his watch the United States "deliberately avoided hysterically devised crash programs and propaganda stunts" in space. But despite claims to the contrary, both at the time and in later years, early U.S. space policy was indeed heavily determined by what the Soviet Union did, especially in the years 1959 and 1960. The most significant indication of this was the initiation of Project Mercury, the program to put a man in orbit around the earth.[93]

In the wake of Sputnik II it had become clear that the next major milestone in space exploration would be to place a human being in space. PSAC's early 1958 report, Introduction to Outer Space, had identified manned flight in orbit as an obvious and attainable goal of space exploration. The same report had speculated about the requirements for a manned lunar landing. The administration's first major policy statement on space, NSC 5814/1, approved in August, 1958, had also cited the

inevitability of manned space exploration and explored its political consequences. The paper argued that the "time will undoubtedly come when man's judgment and resourcefulness will be required fully to exploit the potentialities of outer space." Manned flight, it suggested, could have a major impact on world politics, even greater than Sputnik. "No unmanned experiment can substitute for manned exploration in its psychological effect on the peoples of the world." NSC 5814/1 predicted the Soviets would be able to mount such a flight by 1959-1960.[94]

The implication of this prediction was clear: if the United States wanted to have any chance of avoiding what Killian said could be "a recurrence of the Sputnik hysteria if the Soviets get a 'man in space' first,"[95] it had to initiate a major program to beat them into orbit. By September 1958, a special panel on manned flight declared the U.S. goal was to "achieve at the most early practicable date orbital flight and successful recovery of a manned satellite."[96]

Project Mercury represented everything Eisenhower claimed that he wanted to avoid in space policy. It was hugely expensive, driven almost entirely by the competition with Russia, and lacking in a compelling scientific rationale. A 1960 report by PSAC on putting a man in space resorted to inspirational language, declaring that "among the major reasons for attempting the manned exploration of space are emotional compulsions and national aspirations. These are not subjects which can be discussed on technical grounds." The panel concluded that

"man-in-space cannot be justified on purely scientific grounds, although more thought may show that there are situations for which this is not true."[97] T. Keith Glennan would later comment about Mercury: "As one looks back on that decision, it is clear that we didn't know very much about what we were doing."[98]

Eisenhower's approval of Project Mercury paralleled his failure to control NASA's budget. Eisenhower had originally held that NASA's budget should not be allowed to climb over half a million dollars. Yet by the time he left office, NASA was employing sixteen thousand employees, was spending nearly one billion dollars a year, and had plans for spending much more.[99] One of those plans involved initiating work on a manned lunar expedition. During his last months in office, Eisenhower scored at least one clear victory in his effort to contain the space race when he refused to approve such work. Appalled at PSAC's price tag of $26-38 billion dollars to put a man on the Moon he dismissed the lunar expedition as a "multi-billion-dollar project of no immediate value."[100] In his final budget message to Congress in January 1961, Eisenhower refused to include the funds NASA had requested for post-Mercury space exploration.

Conclusions

As Eisenhower left office, there was a widespread impression that he had moved too slowly in the arena of space exploration and ballistic missile development. The image of the time was that of a president who was tired and uncreative. Eisenhower was seen as failing to grasp both the quickening pace of

technological development and the intense anxiety that Americans felt about falling behind in this area.

The far greater resources that Eisenhower's successor, John F. Kennedy, committed to space seemed further to confirm the charge that Eisenhower's response to Soviet gains in space had been inadequate. The younger, vibrant Kennedy, it appeared, understood what the aging Eisenhower had not: that the U.S. couldn't afford to lose the space race and that bold steps were needed to rehabilitate America's image of technological prowess. During the 1960s and early 1970s, as the space age unfolded and Project Apollo succeeded, Eisenhower's legacy for space policy appeared all the more in question. If the U.S. space program had continued at the moderate pace established by Eisenhower, America might never have made it to the Moon. Yet, as with his presidency in general, Eisenhower's record on space appears different with the benefit of hindsight and the extensive declassification of documents on his presidency.

The argument of this chapter has been that early U.S. space policy reflected elements of Eisenhower's political philosophy and leadership style which have come to be more clearly recognized and appreciated by scholars in recent years. Following Sputnik, Eisenhower projected calm during a time of near-panic, patiently explaining to the public why American security was not at risk. In an atmosphere of intense cold war competition, he resisted conceptualizing space exploration as an out-and-out race with the Soviets and sought, albeit with mixed

success, and used the power of his office to place the pursuit of U.S. space abilities within a balanced program for boosting American scientific prowess. During the last three years of his presidency, Eisenhower resisted enormous political pressures to launch a crash U.S. defense effort. Yet within just ten months of Sputnik's launch, Eisenhower had created NASA and insured that it was an independent civilian agency.

Eisenhower was not a visionary when it came to space policy. Instead, he was a consistent skeptic about the entire enterprise of exploring the heavens. This outlook, however, reflected his larger strategic framework, not a passive approach to the presidency or a failure of imagination. Despite the confusing nature of the space issue, Eisenhower seems to have had a clear idea from the mid-1950s onward of what type of space program he wanted. Through sustained engagement in space policy, especially after Sputnik, he used the power of the rising "imperial presidency" to put in place the kind of cautious program that he believed was most appropriate for the time.

It is never easy for former presidents to watch their successors shift the direction of national policy. During his post-White House years, Eisenhower (who resumed the rank of general of the army) ordinarily resisted criticizing his successors on matters bearing on national security. Still, he was dismayed at President Kennedy's announcement in May 1961 that the United States should place a man on the Moon by the end of the decade. This decision dramatically reversed one that

Eisenhower had made just six months earlier. It appeared, in Eisenhower's view, not only ill-advised but clearly motivated by political expediency--namely, the desire for the Kennedy administration to regain its momentum after the failed Bay of Pigs invasion of April 1961.

In a 1965 letter to Major Frank Borman a NASA astronaut who had been troubled by Eisenhower's criticism of Project Apollo, Eisenhower explained his thinking. "What I have criticized about the current space program is the concept under which it was drastically revised and expanded just after the Bay of Pigs fiasco." Eisenhower wrote that he thought a race to the Moon was unwise and that it distorted America's space program. It "immediately took one single project or experiment out of a thoughtfully planned and continuing program involving communication, meteorology, reconnaissance, and future military and scientific benefits and gave the highest priority--unfortunate in my opinion--to a race, in other words, a stunt."[101]

For the most part, Eisenhower kept quiet about his views on Project Apollo. He did not mount a public campaign against the undertaking or devote whole speeches and articles to criticizing Kennedy's space policy. His most pointed public criticism came in an August 1962 Saturday Evening Post article that dealt with a wide range of public issues. "By all means, we must carry on our explorations in space," Eisenhower wrote, "but frankly I do not see the need for continuing this effort as such a fantastically

expensive crash program." Eisenhower expressed his dismay that NASA was requesting $4 billion a year for space and that this budget figure was headed further upward. He said he felt as proud as anyone about the successes of U.S. astronauts. "But why the great hurry to get to the moon and planets? We have already demonstrated that in everything except the power of our booster rockets we are leading the world in scientific space exploration. From here on, I think we should proceed in an orderly, scientific way, building one accomplishment on another, rather than engaging in a mad effort to win a stunt race."

In the same article, Eisenhower reiterated his long-held views on prestige: "If we must compete with Soviet Russia for world 'prestige,' why not channel the struggle more along the lines in which we excel--and which means so much to the masses of ordinary citizens? Let's put some other items in this 'prestige' race: our unique industrial accomplishments, our cars for almost everybody instead of just the favored few, our remarkable agricultural productivity, our supermarkets loaded with a profusion of appetizing foods." Eisenhower's central point, one that he could not stress enough while president, was that the cold war competition had many fronts and the United States should fight on those where it was strongest.[102]

It was this approach to the cold war that most distinguished Eisenhower from his successor. In contrast to Eisenhower, Kennedy held that the struggle with the Soviet Union had to be waged in every category of power and in every part of the world.

He viewed the psychological component of the struggle to be centrally important, for, as he so often had emphasized as a senator, much of the developing world was still ideologically uncommitted and could be lost to communism if the United States stumbled. In the realm of defense policy, Kennedy argued that it was not enough to rely on the blunt threat of massive retaliation. Instead, the United States must be able to fight and win on each rung in the ladder of escalation, from guerrilla insurgency to conventional war, to nuclear exchanges. Just as crucially, the U.S. willingness to fight had to be totally credible. What all this meant was that America's prestige--the perception abroad of its overall strength and vitality--could not be in question if the United States were to remain secure. In space policy this thinking underpinned a strong determination to decisively beat the Soviets in what Kennedy, unlike Eisenhower, readily acknowledged was a race. Kennedy used his presidential power to carry out this effort, and his announcement of in the Apollo decision was one aspect of his response to the cold war.

The question of which philosophy of cold war competition was best suited to the 1950s and 1960s is so dependent on subjective judgment as to be unanswerable in any final way. Still, a number of conclusions can be drawn.

First, as the Kennedy administration reluctantly acknowledged shortly after taking office, there was no missile gap. Rather, the United States was far stronger than the Soviet Union in the area of missiles and the larger area of strategic

potency.[103] Hence the claim that lack of accomplishment in space was a sign of military weakness was not valid.

Second, the Soviet success in beating the United States into space with the launching of Sputnik did not materially damage the Western cold war position. There were no capitulations to communism by borderline countries or diplomatic concessions to Moscow made by the United States and its NATO allies. In particular, Khrushchev's post-Sputnik missile rattling in Europe won him no tangible gains. If anything, the Soviet triumph in space served to enhance both American security and prosperity by galvanizing the United States to devote additional resources to education and technological innovation.[104]

Finally, and more generally, it is evident that the low priority Eisenhower placed on prestige in the cold war did not result in any international setbacks during the 1950s. In contrast, it is possible to link Kennedy's strong emphasis on prestige (and that of his advisors who went on to serve under Johnson) with America's fiasco in Vietnam. Eight years after a newly inaugurated Kennedy put forth the view that no front in the cold war could be ignored, America successfully landed men on the Moon and returned them safely to earth in one of the greatest technological feats of the 20th century. But it was in that same year, 1969, that America began its retreat from Vietnam--the greatest foreign policy disaster in U.S. history. Arguably both the triumph of Project Apollo and the calamity of the Vietnam war were outgrowths of the same national-security philosophy.

With the passage of time, Eisenhower's broad conception of national prestige has come to be more widely appreciated. In the late 1950s, when America dominated the global economy, Eisenhower seemed old-fashioned and lacking in economic sophistication when he insisted that American prosperity could not be taken for granted and that budgetary irresponsibility could threaten that prosperity. Today, these sentiments do not seem so misplaced. Likewise, Eisenhower was clearly ahead of his time when he stressed that America's economic performance and its standard of living were as important, if not more important, to U.S. prestige than military might and space exploits.

Notes

1. "The President's News Conference of February 3, 1960," Public Papers of the Presidents of the United States: Dwight D. Eisenhower, 1960-61 (Washington, DC: Government Printing Office, 1964).

2. On the transformation of Eisenhower's reputation from that of a passive and mediocre president to that of an informed, involved policymaker (whatever the merits of his policies), see Steven Rabe, "Eisenhower Revisionism: A Decade of Scholarship," Diplomatic History 17 (Winter 1993): 97-115. For a comprehensive review of the literature on Eisenhower's presidency, including the latter day scholarship that accounts for the remarkable improvement of his historical reputation, see the bibliographical essay in Chester J. Pach, Jr., and Elmo Richardson, The Presidency of Dwight D. Eisenhower (Lawrence: University of Kansas Press, 1991), pp. 263-72. For an analysis of Eisenhower's leadership style, see Fred I. Greenstein, The Hidden-Hand Presidency: Eisenhower as Leader (New York: Basic Books, 1982).

3. See, in particular, John Lewis Gaddis, Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy (New York: Oxford University Press, 1983); and Richard H. Immerman, "Confessions of an Eisenhower Revisionist," Diplomatic History 14 (Summer 1990): 319-342.

4. The most thorough treatment of space policy under Eisenhower can found be in Walter A. McDougall, . . . the Heavens and the Earth: A Political History of the Space Age (New York: Basic Books, 1985). For a carefully documented account of the Eisenhower administration's response to the Soviet launching of Sputnik, see Robert A. Divine, The Sputnik Challenge: Eisenhower's Response to the Soviet Satellite (New York: Oxford University Press, 1993). For an excellent earlier examination of the formation of space policy under Eisenhower, see Enid Curtis Bok Schoettle, "The Establishment of NASA," in Sanford A. Lakoff, ed., Knowledge and Power: Essays on Science and Government (New York: Free Press, 1966). See also Rip Bulkeley, The Sputniks Crisis and Early United States Space Policy: A Critique of the Historiography of Space (Indianapolis: Indiana University Press, 1991). For studies of the missile gap controversy, see Desmond Ball, Politics and Force Levels: The Strategic Missile Program of the Kennedy Administration (Berkeley: University of California Press, 1980); and Edgar M. Bottome, The Missile Gap: A Study of the Formulation of Military and Political Policy (Rutherford, NJ: Fairleigh Dickinson University Press, 1971).

5. Immerman, "Confessions of an Eisenhower Revisionist," p. 328.

6. For two recent examinations of Eisenhower and economic policy, see Ivan W. Morgan, Eisenhower Versus the Spenders (New York: St. Martin's Press, 1990), and John W. Sloan, Eisenhower

and the Management of Prosperity (Lawrence: University of Kansas Press, 1991). See also James L. Sundquist, Politics and Policy: The Eisenhower, Kennedy, and Johnson Years (Washington, DC: Brookings Institution, 1968).

7. Quoted by John Lewis Gaddis, Strategies of Containment, p. 134.

8. Morgan, Eisenhower Versus the Spenders, p. 211.

9. Ibid., p. 51.

10. Dwight D. Eisenhower, The White House Years: Waging Peace (Garden City, NY: Doubleday, 1965), p. 217.

11. "Farewell Radio and Television Address to the American People," January 17, 1961, Public Papers of the Presidents: Dwight D. Eisenhower, 1960-61 (Washington: Government Printing Office, 1964), p. 1038.

12. Morgan, Eisenhower Versus the Spenders, p. 11, 82. For more on Humphrey's views, see Sloan, Eisenhower and the Management of Prosperity, pp. 20-25.

13. Gaddis, Strategies of Containment, p. 134.

14. Immerman, "Confessions of an Eisenhower Revisionist," p. 332.

15. Ibid., p. 333.

16. Oral History Interview with James P. Killian, Oral History Research Office, Columbia University, p. 70.

17. Immerman, "Confessions of an Eisenhower Revisionist," p. 335.

18. Secretary of State Dulles, Address to the Council on Foreign Relations, January 12, 1954, Department of State Bulletin, no. 30 (January 25, 1954), p. 108.

19. Gaddis, Strategies of Containment, p. 164.

20. Report on the Present Status of the Satellite Problem," August 23, 1952, Grosse File, NASA Historical Reference Collection, NASA Headquarters, Washington, DC.

21. In de-emphasizing prestige, Eisenhower may have been influenced on the issue of prestige by studies undertaken by the U.S. government during the 1950s which showed that American prestige overseas was very high and quite solid. See, for example: Current Trends in Attitudes Toward the U.S. and U.S.S.R., West European Public Opinion Barometer Report, No. 17, United States Information Agency, June 21, 1956.

22. McDougall, . . .the Heavens and the Earth, p. 119.

23. NSC-5520, Foreign Relations of the United States 1955-1957, Vol. XI (Washington, DC: Government Printing Office, 1988), pp. 723-30 (hereafter FRUS).

24. Memorandum from the President's Special Assistant to the Executive Secretary of the National Security Council, Ibid., p. 730.

25. Memorandum of Discussion at the 283d Meeting of the National Security Council, Washington, May 3, 1956, Ibid., pp. 734-42.

26. Eisenhower, Waging Peace, p. 209.

27. James R. Killian, Jr., Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology (Cambridge, MA: The MIT Press, 1977), p. 76.

28. Eisenhower, Waging Peace, p. 208.

29. Killian, Sputnik, Scientists, and Eisenhower, p. 119.

30. Statement by the President, "Summary of Important Facts in the Development by the United States of an Earth Satellite," October 9, 1957, NASA Historical Reference Collection.

31. Cited in William Burrows, Deep Black: Space Espionage and National Security (New York: Berkeley Books, 1987), p. 67.

32. For background on the U-2 program, and Eisenhower's feelings about it, see Michael R. Beschloss, Mayday: Eisenhower, Khrushchev, and the U-2 Affair (New York: Harper and Row, 1986).

33. McDougall, . . .the Heavens and the Earth, p. 123.

34. Memorandum of Discussion at the 322d Meeting of the National Security Council, May 10, 1957, FRUS 1955-57, Vol. XI, p. 749.

35. Memorandum of Meeting, Working Group on Certain Aspects of NSC 5520, June 13, 1957, Eisenhower Library, NASA Papers, [1], Working Group on Certain Aspects of the Scientific Earth Satellite--Minutes 1956-58.

36. For a comprehensive assessment of Eisenhower's response to Sputnik, see Divine, The Sputnik Challenge.

37. Bulkeley, The Sputniks Crisis and Early United States Space Policy, p. 5.

38. McDougall, . . . the Heavens and the Earth, p. 153.

39. Burrows, Deep Black, p. 90.

40. Eisenhower, Waging Peace, p. 205.

41. Ibid., p. 206.

42. Killian, Sputnik, Scientists, and Eisenhower, p. 7.

43. Ibid., p. 10.

44. Eisenhower, Waging Peace, p. 211.

45. Facts on File, Vol. XVII, No. 884, p. 330.

46. Ibid., p. 331.

47. Eisenhower, Waging Peace, p. 224.

48. Statement by the President, "Summary of the Important Facts in the Development by the United States of an Earth Satellite."

49. Divine, The Sputnik Challenge, p. 10.

50. Discussion at the 339th Meeting of the National Security Council, October 10, 1957, DDE Library, Ann Whitman File, NSC Series, Box 9.

51. Legislative Leadership Meeting, Supplementary Notes, January 7, 1958, DDE Library, Legislative Meetings Series, Box 3.

52. Dwight D. Eisenhower to Professor Lloyd S. Swenson, Jr., August 5, 1965, NASA Historical Reference Collection.

53. See for example, Memorandums of Conference with the President, February 17, 1959 and October 21, 1959, Records of the White House Office of Science and Technology, Box 12.

54. Ibid.

55. Discussion at the 431st Meeting of the National Security Council, January 12, 1960, DDE Library, Ann Whitman File, NSC Series, Box 12.

56. Memorandum of Discussion at the 339th Meeting of the NSC, October 10, 1957, FRUS 1955-1957, Vol. XXIV, pp. 162-163.

57. Ibid., p. 164.

58. Memorandum from the Deputy Director of Intelligence and Research to the Secretary of States, Ibid., pp. 183-84.

59. Senate Special Committee on Space and Astronautics, Compilation of Materials on Space and Astronautics, 85th Congress, 2d Session (Washington, DC: Government Printing Office, 1958), p. 1.

60. McDougall, . . . the Heavens and the Earth, p. 178.

61. Ibid., p. 171.

62. NSC 5814/1, "Preliminary U.S. Policy on Outer Space," August 18, 1958, DDE Library, Office of the Special Assistant for National Security Affairs, Box 67.

63. NSC 5918, "U.S. Policy on Outer Space," December 17, 1959, DDE Library, Office of the Special Assistant for National Security Affairs, Box 70.

64. "Introduction to Outer Space," The White House, March 26, 1958, NASA Historical Reference Collection.

65. T. Keith Glennan, The First Years of the National Aeronautics and Space Administration Vol. I (Unpublished Manuscript, 1964), p. 3.

66. Ibid., p. 37.

67. Killian, Sputnik, Scientists, and Eisenhower, p. 143.

68. Oral History Interview of Gen. Andrew J. Goodpaster, Jr., July 22, 1974, NASA History Office, p. 56.

69. For an in-depth analysis of the missile gap controversy, see Bottome, The Missile Gap.

70. Eisenhower, Waging Peace, pp. 207-10, quotation from p. 207.

71. Greenstein, The Hidden-Hand Presidency, pp. 57-99.

72. Divine, The Sputnik Challenge, p. 45.

73. Ibid., p. 76.

74. Bulkeley, The Sputniks Crisis and Early United States Space Policy, pp. 128-29.

75. Killian, Sputnik, Scientists, and Eisenhower, p. 221.

76. Ibid., p. 228.

77. Fred Kaplan, The Wizards of Armageddon (New York: Simon and Schuster, 1983), p. 136.

78. NSC 5724, "Deterrence and Survival in the Nuclear Age," Security Resources Panel of the Science Advisory Committee, November 7, 1957, NASA Historical Reference Collection.

79. Gaddis, Strategies of Containment, p. 359.

80. Memorandum of Conference with the President, February 6, 1958, Records of the Office of the White House Office of Science and Technology, Box 12.

81. Eisenhower, Waging Peace, 257.

82. For a detailed look at the fight over who would control space policy, see McDougall, . . . the Heavens and the Earth, pp. 157-176, and Schoettle, "The Establishment of NASA," pp. 162-269.

83. Killian, Sputnik, Scientists, and Eisenhower, p. 122.

84. Schoettle, "The Establishment of NASA," p. 233.

85. Killian, Sputnik, Scientists, and Eisenhower, p. 131.

86. Schoettle, "The Establishment of NASA," p. 233.

87. Ibid., p. 192.

88. Killian, Sputnik, Scientists, and Eisenhower, p. 228.

89. Ibid., p. 126.

90. Memorandum of Conference with the President, February 6, 1958.

91. Killian, Sputnik, Scientists, and Eisenhower, p. 122.

92. Glennan, The First Years of the National Aeronautics and Space Administration, pp. 7-8.

93. Eisenhower, Waging Peace, p. 260.

94. NSC 5814/1, "Preliminary U.S. Policy on Outer Space."

95. Memorandum of Conference with the President, February 24, 1959, Records of the White House Office of Science and Technology, Box 12.

96. McDougall, . . . the Heavens and the Earth, p. 200.

97. John M. Logsdon, The Decision to Go to the Moon: Project Apollo and the National Interest (Cambridge, MA: The MIT Press, 1970), p. 35.

98. Glennan, The First Years of the National Aeronautics and Space Administration, p. 18.

99. Jane Van Nimmen and Leonard C. Bruno with Robert L. Rosholt, NASA Historical Data Book, Volume I (Washington, DC: NASA SP-4012, 1988), pp. 70, 137-138. The Eisenhower Administration had requested $915 million for FY 1961 with a supplemental request on Jan. 18, 1961 for $49.6 million more. The Eisenhower budget request for FY 1962 was $1.1 billion. Of the roughly sixteen thousand employees in NASA in early 1961, almost eight thousand had come from the NACA and many others had transferred from the military Vanguard and Saturn programs.

100. Stephen E. Ambrose, Eisenhower the President (New York: Simon and Schuster, 1984), p. 591; Logsdon, The Decision to Go to the Moon, pp. 35-36.

101. Ambrose, Eisenhower the President p. 641.

102. Dwight D. Eisenhower, "Are We Headed In The Wrong Direction?" The Saturday Evening Post, August 11-August 18, 1962, p. 24.

103. Kaplan, Wizards of Armageddon, p. 295.

104. See in particular, Barbara Barksdale Clowse, Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958 (Westport, CT: Greenwood Press, 1981).

Chapter 2

Kennedy and the Decision to Go to the Moon

by

Michael R. Beschloss

In his 1960 presidential campaign, John F. Kennedy never explicitly called for a crash effort to put an American on the Moon by 1970, but his campaign rhetoric pointed in the direction of greater activism in space. Kennedy's critique of Eisenhower and Nixon centered around the charge that the incumbent administration had allowed the United States to fall in danger of slipping behind the Soviet Union in the cold war. He pledged, if elected, to make the United States a nation that was not "first but, first and, first when, first if, but first PERIOD."[1]

It was that desire, as well as Kennedy's faith in the power of science and technology to accomplish great feats, that sparked the 1961 decision to go to the Moon. Kennedy used the amassing power of the "imperial presidency" that resulted from the cold war situation to empower experts, in this case aerospace engineers, with the responsibility and wherewithal to execute as a "crash" program, to place Americans first on the Moon.[2]

Kennedy and Khrushchev

Kennedy framed his desire for American leadership in terms of military and economic strength as well as international prestige. American shortcomings in space gave him a powerful symbol in all three areas. In his effort to demonstrate American

inferiority, Kennedy thus perversely exploited during his presidency the issue of space exploration in exactly the same way that Nikita Khrushchev was doing and to the same effect. In the military field, Kennedy was not averse to leaving Americans somewhat in the dark about the distinction between advances in space exploration and advances in production of ICBMs.

Like Khrushchev, who correctly gambled that launching Sputnik would lead many of the peoples of the world to conclude that the Soviet Union had suddenly gained an important form of military superiority, Kennedy hammered Eisenhower and Nixon for failing to keep up with the Soviets in rocket thrust. In so doing he hoped that this would strengthen his effort to charge that the United States was suffering from a "missile gap," lagging behind the Soviets in ICBMs. During the 1960 debates, he told Nixon, "You yourself said to Khrushchev, 'You may be ahead of us in rocket thrust, but we're ahead of you in color television."[3] Elsewhere Kennedy said, "I will take my television in black and white. I want to be ahead of them in rocket thrust."[4]

Khrushchev had argued that Soviet space achievements were an emblem and dividend of the superior Soviet economic growth rates. So did Kennedy. Khrushchev had exploited his space triumphs to suggest to newly emerging Third World nations that his was the system to emulate. Kennedy too argued that American failures in space weakened U.S. prestige, and he produced a series of U.S. Information Agency poll findings to prove it. With amazing

overstatement, even for a campaign, Kennedy said in New York in October 1960, "The key decision which [the Eisenhower] administration had to make in the field of international policy and prestige and power and influence was their recognition of the significance of outer space. . . . The Soviet Union is now first in outer space."[5]

Thus when Kennedy was elected in November 1960, he was compelled to use the power of his office to make dramatic gestures, as he put it, to "turn the tide" back in favor of the United States in the cold war.[6] This was difficult to do with the "missile gap." If he had any doubt before the election, he had none afterwards, when given U.S. classified information, that the "missile gap" had been a false issue and that the United States held a large lead over the Soviet Union in ICBMs.

It was also difficult to turn the tide with economic growth. If Kennedy had any doubt during the campaign, he knew after the election that his comparison of superior Soviet growth rates to those of the United States had been bogus. Not only was he privy to classified information that demonstrated the desperate weaknesses of the Soviet economy, he also knew that the reason why Soviet economic growth looked so much better than America's was because the 1959 figures he had used were taken in the middle of the worst U.S. recession in years and that the Soviet rate was artificially inflated by cheating and the fact that the Soviet economy was rebounding from the devastation of World War II. All of this increased Kennedy's motivation in December 1960 to find

some quick way of seeming to boost the American position in the cold war and vindicate the rhetoric of his campaign.

The Definition of a Space Policy

At that moment, the outgoing president, Dwight Eisenhower, received a classified report of an ad-hoc panel on manned spaceflight. The panel asked the question of "whether the presence of a man adds to the variety or quality of the observations which can be made from unmanned vehicles--in short, whether there is a scientific justification to include man in space vehicles."

Its answer was a polite no: "Man's senses can be satisfactorily duplicated at remote locations by the use of available instrumentation. . . . It seems, therefore, to us at the present time that man-in-space cannot be justified on purely scientific grounds. . . . On the other hand, it may be argued that much of the motivation and drive for the scientific exploration of space is derived from the dream of man's getting into space himself."[7]

This finding dovetailed perfectly with Eisenhower's views. If anything, Eisenhower had a tin ear for the effect of space achievements on America's international position. In 1957, he had not dreamt that the launching of an Earth satellite could have had remotely the impact that Sputnik did on Soviet prestige--and he refused to be stampeded afterwards by Senators like John Kennedy and Lyndon Johnson who demanded that the U.S. catch up. Eisenhower felt that spending on space exploration

could be seriously defended only in military and scientific terms. He felt that among the various forms of space exploration, manned spaceflight should be nothing more than one instrument in the symphony. He said he was not willing to "hock my jewels" to support the enormous cost of sending an American quickly to the Moon, which he regarded as a "stunt." He said that he "couldn't care less whether a man ever reached the moon."[8] And he used his presidential power to circumvent other politicians' plans to increase space activities that he thought were unwise. As a result, the civil space effort in the Eisenhower administration was moderate and measured, much to the chagrin of its advocates.

Moreover, Eisenhower in setting up the National Aeronautics and Space Administration, had used his presidential power to put in charge of it people who shared his perspective on space exploration and how aggressively it should be pursued. His administrator, T. Keith Glennan perfectly reflected Eisenhower's priorities in space. He emphasized a well-rounded, measured space program that did not focus on "spectacular" missions designed to "one-up" the Soviets. He also believed that the new space agency should remain relatively small, and that much of its work would of necessity be done under contract to private industry and educational institutions.[9] Hugh L. Dryden, Glennan's deputy, expressed repeatedly a cautious stance regarding competition with the Soviets in any space race. On April 16, 1958, for example, he testified before a House

Committee that a Defense Department human spaceflight proposal had "about the same technical value as the circus stunt of shooting the young lady from the gun," and lacked any scientific merit.[10]

None of this set well with Kennedy, who saw the opportunity to use the presidential office for aggressive political ends and the cold war space rivalry as the avenue where capital could be expended with positive political results. He was disappointed in January 1961, therefore, when then President-elect Kennedy received the report of his own task force on space, chaired by Jerome Wiesner, who was to become his White House science adviser. Interestingly, virtually every member of the panel had been deeply involved as outside consultants in the Eisenhower administration's policies toward space. Thus the Wiesner Report, which was written for public consumption, was not the ringing denunciation of Eisenhower's lassitude on space that Kennedy and his entourage might have hoped for.

It conceded that "during the next few years, the prestige of the United States will in part be determined by the leadership we demonstrate in space activities"--and that recent U.S. accomplishments in space had "not been impressive enough." Still, as far as manned exploration was concerned, it was "very unlikely that we shall be the first in placing a man into orbit around the earth." The panel warned that "space activities are so unbelievably expensive and people working in this field are so imaginative that the space program could easily grow to cost many

more billions of dollars per year."[11]

The Wiesner Report's conclusion was not too different from Eisenhower's--that human spaceflight should not be given a distorted amount of attention in the context of other space activities. This did not delight the new president. Kennedy treated the panel's findings like a skunk making its appearance at a wedding. He told reporters, "I don't think anyone is suggesting that their views are necessarily in every case the right views."[12] As with so many areas of his policy toward the Soviet Union during the first two months of his presidency, Kennedy played for time on space and kept his options open.

In March 1961, sensing an opportunity, the new NASA administrator, James E. Webb, asked Kennedy's budget director, David Bell, for a thirty-percent increase in the budget his agency had been allocated by Eisenhower. Bell wrote Kennedy that he wondered whether the U.S. should run races it might lose anyway, that there were other better and cheaper ways of enhancing American prestige, and that "the total magnitude of present and projected expenditures in the space area may be way out of line with the real values of the benefits."[13] Bell told Hugh Dryden of NASA that he had better be patient, because the president had other problems to worry about. Dryden replied, with some prescience if without much feeling, "You may not feel he has the time, but whether he likes it or not, he is going to have to consider it. Events will force this."[14]

That same week, Kennedy saw his new NASA administrator,

James Webb, who on taking office was eager "to make unmistakably clear our support for the manned spaceflight program."[15] Webb had been recommended to Kennedy by his business associate, oil man Robert Kerr of Oklahoma, the new chairman of the Senate's Space Committee. Webb, a denizen of Washington political circles since the 1930s and had served as Truman's budget director and an undersecretary of state, had fled the city only with the coming to power of Eisenhower in 1953. Now he was back, full of a desire to use the power of the federal government to accomplish "new deal-type" programs on behalf of the nation, and by temperament not the kind of man to tolerate an America that was "first if" or "first when." Nor was he the kind of man to be content with a modest mission or budget for the agency he had made some financial sacrifices to oversee.[16]

Using language that played to his audience, Webb told Kennedy, "The extent to which we are leaders in space science and technology will in large measure determine the extent to which we, as a nation, pioneering on a new frontier, will be in a position to develop the emerging world forces and make it the basis for new concepts and applications in education, communications and transportation, looking toward more viable political, social and economic systems for nations willing to work with us in the years ahead."[17] Webb made a sale. In his defense message to Congress on March 25, 1961, Kennedy asked for $125.7 billion for the kind of large boosters that would lead to a Moon mission. Still he was marking time. He told Webb that he

would not make any final decision on the main elements of the NASA request until the fall of 1961.[18]

Crisis

Then Kennedy's plans were changed by two unexpected events in mid-April. On April 12, for the first time, the Soviets launched Yuri Gagarin into Earth orbit, creating a worldwide space sensation dwarfed only by Sputnik. One NASA scientist said summarized the perspective of space exploration advocates: "Wait until the Russians send up three men, then six, then a laboratory, start hooking them together and then send back a few pictures of New York for us to see."[19]

On the day after the Gagarin triumph, Webb came to the Oval Office. Like Eisenhower after Sputnik, he was not spooked by Gagarin. He said, "The solid, onward, step-by-step pace of our program is what we are more interested in than being first."[20] To boost Kennedy's spirits, he carried a desk model of the Mercury capsule that would soon take the first American into space. Kennedy had enough of a sense of humor to tell one aide afterwards that Webb had probably bought it in a toy store that morning. He asked NASA for a study of the feasibility and costs of an accelerated civilian space program.

Kennedy could easily afford to tolerate the Gagarin success. Less than three months in office, he knew that he could not be blamed for the American disadvantage he had criticized so sharply on the campaign trail. Then, one week later, the sky fell when CIA-backed Cuban exiles failed in their invasion of Fidel

Castro's Cuba at the Bay of Pigs.

No matter how much Kennedy's aides tried, through background interviews with reporters, to shift the blame to Eisenhower--and they did--Kennedy knew that this debacle had the power to shatter his entire administration. The Bay of Pigs suggested to Americans that they had elected a president who was at least inexperienced, and at worst incompetent. Especially after American reversals in Laos and the Congo, Kennedy's failure in Cuba was exactly the kind of cold war setback that he had denounced throughout the campaign and pledged to avoid if he were elected president. He was desperately in need of something that would divert the attention of the public and identify the president with a cause that would unify the American public behind his administration.

On April 20, the day Kennedy knew for certain that the Bay of Pigs had failed, he called in Vice President Lyndon Johnson, Chairman of his Space Council, and asked him to come up with something fast in space. He gave Johnson a memo that was redolent of presidential panic. It said, "Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man. Is there any other space program which promises dramatic results in which we could win?" Kennedy went on, "How much additional would it cost? Are we working 24 hours a day on existing programs? If not, why not? . . . Are we making maximum effort? Are we achieving necessary

results? . . . I would appreciate a report on this at the earliest possible moment."[21] That day, Kennedy told reporters, "If we can get to the moon before the Russians, we should."[22]

By giving the chairmanship of his Space Council to Johnson, another member of the Senate who had used Sputnik to good political advantage in criticizing the Eisenhower administration and therefore required to advocate a stronger space program, Kennedy had tipped the scales in the direction of an aggressive effort in space. While in the Senate, Johnson had if anything been more extreme than Kennedy in his demands for an accelerated space effort. After Sputnik he had grandiloquently exclaimed that the nation that controlled the "high ground" of outer space had the capacity to rule the world.[23] As president and vice president Kennedy and Johnson were alike in that they saw the presidency as a tool to accomplish all types of goals, and in the early 1960s both emphasized its prerogative over the other branches of government. The space endeavor fit that mindset well, with its large objectives of cold war "one-up-manship" and its seemingly peaceful and moral purpose.

Johnson went to NASA for information to answer the president's questions on what to do in space to "beat" the Soviets. On April 22, 1961, NASA's Hugh Dryden responded to the request about a Moon program by writing that there was "a chance for the U.S. to be the first to land a man on the moon and return him to earth if a determined national effort is made." He added that the earliest this feat could be accomplished was 1967, but

that to do so would cost about $33 billion dollars, a figure $10 billion more than the whole projected NASA budget for the next ten years.[24]

He also asked Robert McNamara, Secretary of Defense, for his views. McNamara knew what was on Kennedy's mind and after three months in the New Frontier, he was already adept at using the kind of language and arguments that would win the favor of this president. With the exception of Attorney General Robert Kennedy, McNamara had already proven himself the dominant figure in the Kennedy Cabinet. Aside from knowing that Kennedy wanted an accelerated space program, McNamara had another motivation: the increased effort would make a perfect customer for companies in the aerospace industry that were already irate over the cutbacks McNamara was planning in the U.S. defense program. McNamara flatly wrote Johnson, "Major achievements in space contribute to national prestige. This is true even though the scientific, commercial or military value of the undertaking may, by ordinary standards, be marginal or economically unjustified. What the Soviets do and what they are likely to do are therefore matters of great importance from the viewpoint of national prestige."[25]

Johnson also canvassed friends in private business, as well other officials in government, including the fabled space scientist Wernher von Braun, who had built V-2s for the Nazis in World War II and come to the United States in 1945. Von Braun told him that the U.S. had "a sporting chance of sending a 3-man

crew around the moon ahead of the Soviets" and "an excellent chance of beating the Soviets to the first landing of a crew on the moon (including return capability, of course.)" He added:

> The reason is that a performance jump by a factor ten over their present rockets is necessary to accomplish this feat. While today we do not have such a rocket, it is unlikely that the Soviets have it. Therefore we would not have to enter the race toward this obvious next goal in space exploration against hopeless odds favoring the Soviets. With an all-out crash program I think we could accomplish this objective in 1967-1968.

Von Braun ominously added, "I do not believe that we can win this race unless we take at least some measures which thus far have been considered acceptable only in times of a national emergency."[26]

After gaining these technical opinions, understanding Kennedy's use of the power of the presidential office to advocate a strong space effort would be worthless without savvy consensus-building, Johnson began to persuade political leaders of the need to press on with an aggressive lunar landing program. He brought together Senators Robert Kerr (D-OK) and Styles Bridges (R-NH) and spoke with several Representatives to ascertain if they were willing to support an accelerated space program. Whenever he heard reservations Johnson used his forceful personality to persuade. "Now," he asked, "would you rather have us be a second-rate nation or should we spend a little money?" He also

persuaded Secretary of State Dean Rusk, a member of the Space Council, to support the initiative because of the Soviet Union's image in the world. Rusk wrote to the Senate Space Committee a little later that "We must respond to their conditions; otherwise we risk a basic misunderstanding on the part of the uncommitted countries, the Soviet Union, and possibly our allies concerning the direction in which power is moving and where long-term advantage lies." It was clear early in these deliberations that Johnson was in favor of an expanded space program in general and a maximum effort to land an astronaut on the Moon.[27]

Kennedy's mandate to Johnson had been framed so bluntly and specifically that the vice president was unlikely to return to the Oval Office and tell his boss that he should stop worrying about space and turn to other matters. This was especially true because in the spring of 1961, Johnson was working hard to maximize his influence on the Kennedy administration. He also knew that if he had any presidential ambitions for 1968, as he probably did, they would largely depend on Kennedy's attitude toward his vice president.

Thus, not surprisingly, on April 28, Johnson gave Kennedy a report that was largely what the president wished to hear. Sounding like Kennedy on the campaign trail, it said:

> The U.S. has greater resources than the U.S.S.R. for attaining space leadership but has failed to make the necessary hard decisions and to marshal those resources to achieve such leadership. . . . This country should be

> realistic and recognize that other nations . . . will tend to align themselves with the country which they believe will be the world leader--the winner in the long run. Dramatic accomplishments in space are being increasingly identified as a major indicator of world leadership. . . . We are neither making maximum effort nor achieving results necessary if this country is to reach a position of leadership.

Johnson said that manned exploration of the Moon was essential, whether or not the U.S. turned out to be first. In this exercise Johnson had built, as Kennedy had wanted, a strong justification for a presidential initiative to undertake Project Apollo but he had also moved on to develop a greater consensus for the objective among key government and business leaders.[28]

While NASA's leaders were enthusiastic with the course Johnson was recommending--they understood the political reasons for adopting an aggressive lunar landing program first--they wanted to shape it as much as possible to the agency's long-run priorities. NASA Administrator James Webb, well known as a skilled political operator who could seize an opportunity, organized a short-term effort to accelerate and expand a long-range NASA master plan for space exploration. A fundamental part of this effort addressed a legitimate concern that the scientific and technological advancements for which NASA had been created not be eclipsed by the political necessities of international rivalries. Webb conveyed the concern of the agency's technical

and scientific community to Jerome Wiesner on May 2, 1961, noting that "the most careful consideration must be given to the scientific and technological components of the total program and how to present the picture to the world and to our own nation of a program that has real value and validity and from which solid additions to knowledge can be made, even if every one of the specific so-called 'spectacular' flights or events are done after they have been accomplished by the Russians." He asked that Wiesner help him "make sure that this component of solid, and yet imaginative, total scientific and technological value is built in."

Although the White House agreed that the program should be balanced, with an accelerated Moon landing as its centerpiece, James Webb was not yet convinced. He did not wish to undertake a Moon project unless assured that NASA would have full funding and support. Thus he refused to argue on NASA's behalf for a Moon program. On May 3, Johnson called him to a meeting that included Senator Kerr to suggest that Webb would get what he wanted and get him to change his mind. In his notes for the meeting, Johnson said, "We are here to discuss not WHETHER, but HOW--not WHEN, but NOW."[29] In vintage Johnsonian language, he compared the space program to his success in bring electricity to the Hill Country of Texas. He told Webb, "So far NASA has gotten everything it has asked for. I want them to plan and dream big enough to get us out ahead."[30]

Webb caved in. Five days later, he gave Johnson what he

wanted--a letter, written jointly with McNamara, asking for a tacit new doctrine in U.S. space policy that would lead to an Apollo Moon landing before 1970. No longer would the U.S. government follow the principle defined by Eisenhower that projects that were part of the space competition with the Soviet Union had to have other elements of "intrinsic merit." It said:

> This nation needs to make a positive decision to pursue space projects aimed at enhancing national prestige. . . . The non-military, non-commercial, non-scientific but "civilian" projects such as lunar and planetary exploration are, in this sense, part of the battle along the fluid front of the cold war. Such undertakings may affect our military strength only indirectly, if at all, but they have an increasing effect upon our national posture. . . . We recommend that our National Space Plan include the objective of manned lunar exploration before the end of this decade. . . . The orbiting of machines is not the same as the orbiting or landing of man. It is man, not merely machines, in space, that captures the imagination of the world. . . . Even if the Soviets get there first, as they may . . . it is better for us to get there second than not at all. . . . If we fail to accept this challenge, it may be interpreted as a lack of national vigor and capacity to respond.[31]

With Johnson on a presidential mission to Southeast Asia, Kennedy discussed the Webb-McNamara report with his Cabinet on May 10. Bell of the Budget Bureau was concerned about setting

specific dates for a Moon landing and about spending so much money on prestige. Arthur Goldberg, secretary of labor, opposed the idea that a Moon program would stimulate the economy. But Kennedy's intentions were clear. Jerome Wiesner later recalled that when McNamara noted that without Apollo, there would be a dangerous oversupply of manpower in the aerospace industry, "this took away all argument against the space program."[32]

Decision

At the end of May, Kennedy was to fly to Europe for a summit with Khrushchev. He did not wish to go in the wake of American failures in Laos, the Congo, Cuba, and in space. He decided to break presidential tradition by delivering a second State of the Union address on 25 May that would deal with "urgent national needs" where he planned to the invoke the power of the presidency to initiate an aggressive lunar landing program. That speech would ask for the most open-ended commitment ever made in peacetime in order to land an American on the Moon and was representative what may have been the high-tide of the "imperial presidency."

As the speech was written, Kennedy squabbled with his advisers over what date should be announced as the target for the Moon landing. Webb suggested that a late 1968 Moon trip would be a triumphant climax to his second term as president. White House aides more cautiously suggested saying "before this decade is out." They reasoned that this could be interpreted to include 1970.[33] They may also have felt that if no landing occurred

before the end of 1970, blame for the failure could be shifted from Kennedy to his successor.

Speaking before Congress, Kennedy sought to avoid the sense that his demand was being hastily made in the wake of Gagarin and the Bay of Pigs. He specifically noted that he had been reviewing U.S. space policy "since early in my term." Space, he said, "may hold the key to our future on earth. . . . I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth." Kennedy departed from his prepared text--the only time he ever did that before Congress as president--to say, "Unless we are prepared to do the work and bear the burdens to make it successful, there would be no sense in going ahead."[34]

His aide Theodore Sorensen thought that the President's voice sounded "urgent but a little uncertain." Afterwards, while riding with Sorensen in the car back to the White House, Kennedy said that the routine applause that greeted his announcement had sounded "something less than enthusiastic." He said that twenty billion dollars was "a lot of money." The Congressmen knew "a lot of better ways to spend it."[35]

Former president Dwight D. Eisenhower wrote a friend that Kennedy's decision to back a crash program for the Moon was "almost hysterical" and "a bit immature."[36] In 1965, he complained to astronaut Frank Borman of how the Moon program "was drastically revised and expanded just after the Bay of Pigs

fiasco. . . . It immediately took one single project or experiment out of a thoroughly planned and continuing program involving communication, meteorology, reconnaissance and future military and scientific benefits and gave the highest priority--unfortunate, in my opinion--to a race, in other words, a stunt."[37] But the Congress agreed with Kennedy, in part measure because of intense consensus-building by Johnson and other politicians, by a nearly unanimous vote. Apollo became the dominant element of the U.S. space program. The U.S. budget for space was increased by fifty percent in 1961. The next year, it exceeded all pre-1961 space budgets put together.

The reaction of Eisenhower's NASA administrator, T. Keith Glennan, was especially insightful of conservative reaction to the Kennedy decision. For instance he told Eisenhower, then in retirement at Gettysburg, Pennsylvania, that "this is a very bad move--that we are entering into a competition which will be exceedingly costly and which will take up an increasingly large share of that small portion of the nation's budget which might be called controllable."[38] Glennan harped on this issue for years, never quite able to understand the philosophy of the Kennedy administration that large expenditures for science and technology in the form of a race to the Moon against the Soviets could hold positive benefit for the nation.

Glennan also told Kennedy's NASA head, James Webb, of his dismay at the Apollo mandate.

I have no doubt at all as to the desirability and

inevitability of manned flight to the moon. And I would accept--not willingly--a national decision to beat the Russians to the moon if such a decision resulted in a truly "crash" program with no effort spared or held back. No one knows the intentions of the Soviet Union but all of us understand the ability they have to dedicate men and facilities and treasure to that particular effort then believe desirable or necessary. To enter a "race" against an adversary under such conditions and to state that no additional taxes are necessary--indeed to suggest tax reductions--does no seem to me to be facing facts nor to be completely frank about the on-going program. . . .

There can be only one real reason for such a "race". That reason must be "prestige". The present program without such a "race" but with full intention of accomplishing whatever needs to be accomplished in lunar and planetary exploration, unmanned and/or manned, is a vigorous and costly one. It will produce most of the significance technology and essentially all of the scientific knowledge that will be produced under the impetus of the "race" and at the lower cost in men and money . . .

No, Jim, I cannot bring myself to believe that we will gain lasting "prestige" by a shot we may make six to eight years from now. I don't think we should play the game according to the rules laid down by our adversary.[39]

The best way to establish the importance of John F. Kennedy

in the decision to go to the Moon is to imagine what might have occurred in the winter and spring of 1961 had Dwight Eisenhower been somehow elected to a third term: unmotivated to use space as a battlefield in the cold war, unstampeded by setbacks in Asia, Africa, and Latin America, worried about the rising impact of the military-industrial complex and its academic counterparts, determined to achieve a balanced budget, Eisenhower would have been content not to have an American astronaut reach the Moon by 1970, or ever, and have used the power of his office to resist other initiatives to conduct an accelerated space effort.

It is a measure of Kennedy's aversion to long-term planning and his tendency to be rattled by momentary crises that one might conclude that in the absence of the Gagarin triumph and the Bay of Pigs fiasco in April 1961, he might never have gone to the length of asking Congress to spend twenty billion dollars on a crash Moon program. Kennedy's desire for a quick, theatrical reversal of what seemed to be his new administration's flagging position, especially before a summit with Khrushchev, is a more potent explanation of his Apollo decision than any other. Johnson's desire for turf, McNamara's desire to use aerospace overcapacity, Kennedy's own conviction that a Moon program was consistent with what Sorensen called "the New Frontier spirit of discovery"[40]--these things helped the decision along, but none was decisive.

Assessment

Without question Kennedy had correctly gauged the mood of

the nation. His commitment captured the American imagination and was met with overwhelming support. No one seemed concerned either about the difficulty or about the expense at the time. Congressional debate was perfunctory and NASA found itself literally pressing to expend the funds committed to it during the early 1960s. Like most political decisions, at least in the U.S. experience, the decision to carry out Project Apollo was an effort to deal with an unsatisfactory situation (world perception of Soviet leadership in space and technology). As such, Apollo was a remedial action ministering to a variety of political and emotional needs floating in the ether of world opinion. Apollo addressed these problems very well. In announcing Project Apollo Kennedy put the world on notice that the U.S. would not take a back seat to its superpower rival. John Logsdon commented: "By entering the race with such a visible and dramatic commitment, the United States effectively undercut Soviet space spectaculars without doing much except announcing its intention to join the contest."[41]

Kennedy may have understood that the lunar landing was so far beyond the capabilities of either the United States or the Soviet Union in 1961 that the early lead in space activities taken by the Soviets would not predetermine the outcome. As a result it gave the U.S. a reasonable chance of overtaking the Soviet Union in space activities and recovering a measure of lost status. Even so, Kennedy's political objectives were essentially achieved with the presidential decision to go to the Moon, and he

did not necessarily think much about the long term consequences.

Since, as Kennedy conceded, his decision for an accelerated Moon landing was ultimately a political decision made in terms of cold war strategy, how does it stand up now that the cold war is over? Not well. We now know that the reason why the Soviet Union surrendered in that struggle was that it recognized that it could not compete with Western economies and Western societies in those areas of life and death which mattered. The Moon program contributed a great deal to the United States in other terms. But in cold war terms, tens of billions of 1960s dollars, spent on what Kennedy essentially thought of as world propaganda, could probably have better devoted at that time to areas of U.S. defense or the American domestic economy that might have convinced the Soviets more quickly that it was fruitless for them to continue to prosecute their tragic conflict with the United States.

As taxpayers complained about the cost, scientists about the slighting of more important projects, Republicans began using the word "boondoggle" and "science fiction stunt."[42] In 1962, Kennedy was shown hints that the Soviets were not going to compete with the U.S. for the Moon. By April 1963, he was asking Lyndon Johnson for advice on how the Apollo program could be justified in terms other than cold war prestige. Johnson replied with the reassuring old argument that "our space program has an overriding urgency that cannot be calculated solely in terms of industrial, scientific or military development. The future of

society is at stake."[43]

In the fall of 1963, at the United Nations, Kennedy made his most serious public insistence that the United States and Soviet Union explore the Moon together. We shall never know for certain whether this was predominantly an effort, in the wake of the Partial Nuclear Test Ban Treaty, to relax the cold war, or an effort by Kennedy to back away gracefully from an expensive Moon race from which the other side seemed to be backing away.

Notes

1. Michael R. Beschloss, The Crisis Years: Kennedy and Khrushchev, 1960-1963 (New York: Harper, 1991), p. 28.

2. This deference to the authority of expertise was also seen in other technical arenas. See Bruce E. Seely, Building the American Highway System: Engineers as Policy Makers (Philadelphia, PA: Temple University Press, 1987); Samuel P. Hays, with Barbara D. Hays, Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985 (Cambridge, England: Cambridge University Press, 1987); Thomas L. Haskell, ed., The Authority of Experts: Studies in History and Theory (Bloomington: Indiana University Press, 1984); John G. Gunnell, "The Technocratic Image and the Theory of Technocracy," Technology and Culture, 23 (July 1982): 392-416; Mark H. Rose and Bruce E. Seely, "Getting the Interstate System Built: Road Engineers and the Implementation of Public Policy, 1955-1985," Journal of Public Policy, 2 (1990): 23-55.

3. U.S. Senate, Joint Appearances of Senator John F. Kennedy and Vice President Richard M. Nixon (Washington, DC: Government Printing Office, 1961).

4. U.S. Senate, The Speeches of Senator John F. Kennedy: Presidential Campaign of 1960 (Washington, DC: Government Printing Office, 1961).

5. Ibid.

6. John F. Kennedy, Address to Congress, January 29, 1961.

7. President's Science Advisory Committee, "Report of The Ad Hoc Panel on Man-in-Space," December 16, 1960, Dwight D. Eisenhower Library.

8. T. Keith Glennan Diary, December 20, 1960, Dwight D. Eisenhower Library.

9. These themes are well developed in T. Keith Glennan's diary. See also, "Glennan Announces First Details of the New Space Agency Organization," October 5, 1958, NASA History Division Reference Collection; Killian, Sputnik, Scientists, and Eisenhower, pp. 141-44; James R. Killian, Jr., Oral History, 23 July 1974, NASA History Division Reference Collection. Eisenhower's concerns about this aspect of modern America are revealed in "Farewell Radio and Television Address to the American People," January 17, 1961, Papers of the President, Dwight D. Eisenhower 1960-61 (Washington, DC: Government Printing Office, 1961), pp. 1035-40.

10. U.S. Congress, House Select Committee on Astronautics and Space Exploration, Astronautics and Space Exploration, Hearings on H.R. 11881, 85th Cong., 2d Sess. (Washington, DC: Government Printing Office, 1958), p. 117.

11. "Report to the President-elect of the Ad Hoc Committee on Space," January 12, 1961, John F. Kennedy Library.

12. New York Times, January 26, 1961.

13. David Bell to John F. Kennedy, "NASA Budget Problem," undated, March 1961, NASA Historical Reference Collection, NASA History Office, Washington, DC.

14. Quoted in John M. Logsdon, The Decision to Go to The Moon: Project Apollo and the National Interest (Cambridge, MA: MIT Press, 1970), p. 91.

15. Walter A. McDougall, ...The Heavens and The Earth: A Political History of the Space Age (New York: Basic Books, 1985), p. 312.

16. This is well documented in W. Henry Lambright, The Power Behind Apollo: James E. Webb and NASA in the 1960s (Baltimore: Johnson Hopkins University Press, forthcoming 1994).

17. James E. Webb, "Administrator's Presentation to the President," March 21, 1961, NASA Historical Reference Collection.

18. McDougall, Heavens and Earth, pp. 317-18.

19. Quoted in Hugh Sidey, John F. Kennedy, President (New York: Atheneum, 1964), p. 99.

20. Quoted in Logsdon, Decision to Go to the Moon, p. 105.

21. John F. Kennedy to Lyndon B. Johnson, April 20, 1961, John F. Kennedy Library.

22. New York Times, April 22, 1961.

23. New York Times, January 8, 1958.

24. Hugh L. Dryden to Lyndon B. Johnson, April 22, 1961, Vice Presidential Security File, box 17, John F. Kennedy Library; Logsdon, Decision to Go to the Moon, pp. 59-61, 112-14.

25. Robert S. McNamara to Lyndon B. Johnson, "Brief Analysis of Department of Defense Space Program Efforts," April 21, 1961, Lyndon B. Johnson Library.

26. Wernher von Braun to Lyndon B. Johnson, April 29, 1961, NASA Historical Reference Collection.

27. Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," in Robert A. Divine, ed., The Johnson Years: Vietnam, the Environment, and Science (Lawrence: University Press of Kansas, 1987), pp. 231-33.

28. Lyndon B. Johnson to John F. Kennedy, April 28, 1961, NASA Historical Reference Collection.

29. Opening Statement by Lyndon B. Johnson and Notes, Vice

President's Ad Hoc Meeting, May 3, 1961, NASA Historical Reference Collection.

30. Ibid.

31. James E. Webb and Robert S. McNamara to John F. Kennedy, May 8, 1961, John F. Kennedy Library.

32. James Wiesner oral history, NASA Historical Reference Collection.

33. Theodore C. Sorensen, Kennedy (New York: Harper, 1965) p. 525.

34. John F. Kennedy, "Urgent National Needs", Reading Text, May 25, 1961, John F. Kennedy Library.

35. Sorensen, Kennedy, p. 526.

36. Beschloss, Crisis Years, p. 166.

37. Ibid.

38. T. Keith Glennan to Dwight D. Eisenhower, May 31, 1961, Glennan Personal Papers, 19DD4, Archives, Case Western Reserve University, Cleveland, OH.

39. T. Keith Glennan to James E. Webb, July 21, 1961, Glennan Personal Papers, 19DD4.

40. Sorensen, Kennedy, p. 525.

41. John M. Logsdon, "An Apollo Perspective," Astronautics & Aeronautics, December 1979, pp. 112-17.

42. See McDougall Heavens and Earth, pp. 389-93.

43. John F. Kennedy to Lyndon B. Johnson, April 9, 1963, and Lyndon B. Johnson to John F. Kennedy, May 13, 1963, NASA Historical Reference Collection.

Chapter 3

Johnson, Project Apollo, and the Politics of Space Program Planning

by

Robert Dallek

Lyndon Johnson was a difficult, imperious character with a penchant for overheated rhetoric and big political plans. He left a record of landmark social gains and disastrous public failures, always using his presidential office to the hilt. Civil rights, voting rights, and Medicare alone are enough to give him a place in twentieth-century American history with Franklin Roosevelt, the greatest domestic reform president in the national experience. Johnson's spectacular failure in Vietnam is enough to label him as one of the worst foreign policy leaders in the country's history. In the nearly twenty-five years since he left the White House we have not come to terms with this political giant. Indeed, this generation of Americans probably never-will. Memories of Johnson's many transgressions against the national self-esteem remain too fresh to allow a sufficiently detached assessment of the man's impact on the country's life. Hopefully, this will change in time. For we need to see Johnson's career not as a chance to indulge our sense of moral superiority, but as an opportunity to gain an understanding of many subjects crucial to the nation's past and future.

Space policy seems as good a place as any to begin. For the

major part Johnson played in shaping the country's space program in the 1950s and 1960s did not provoke then, nor does it now, the kind of controversy we associate with his war on poverty, the Great Society, and Vietnam. Moreover, Johnson's views of space tell us a great deal about his whole political career: about his priorities and the means he used to achieve them. More specifically, four considerations determined Johnson's thinking about space policy in the years between 1957 and 1969: national security, personal political and party gain, domestic social advance, and budgetary constraints. None of these concerns, however, operated to the exclusion of the others. To be sure, at one time or the other each of these goals became the dominant motive in determining LBJ's response to changing circumstances at home and abroad, but the other aims were never far from his mind. Yet however much Johnson's motives altered over time in dealing with space matters and however much his levels of support for space exploration rose and fell, especially in the last years of his presidency, he deserves to be remembered as the elected official who did as much, if not more, for space exploration than any other American political leader in this century.

LBJ and Early Space Policy

Sputniks I and II, the Soviet earth satellites, launched in October and November 1957 spurred Johnson's initial interest in fostering an aggressive American space program. His primary aim was to advance the country's missile technology and eliminate a "missile gap" between the U.S. and the USSR. Secondly, he

believed that promoting a space program was good politics for himself and his party. "The issue [Sputnik] is one which, if properly handled, would blast the Republicans out of the water, unify the Democratic party, and elect you President," George Reedy, a principal Senate aide, told him. "I think you should plan to plunge heavily into this one." Johnson saw the political advantage to himself and the Democrats in seizing the space issue. But he feared a witch hunt that might undermine confidence in the country's military strength and encourage the belief that we could not meet the Soviet challenge.

Johnson genuinely put the national security issue first in trying to design a response to the Soviet's demonstrated superiority in the space race. During the winter of 1957-58, as chairman of an Armed Services subcommittee on preparedness, he held hearings on how the United States could produce better missiles at a faster rate. The hearings sole objective, he declared, was securing the defense of the United States; he had no interest in finger pointing or assessing blame for past mistakes, and wished to use the past strictly as a guide for future action. John Steele, Time's congressional correspondent, told his editors that Johnson would "run a good investigation" that would serve a useful purpose. There would be no "political witch-hunt. Johnson knows that a good investigation is the only kind that will satisfy anyone, and in the end bring credit to anyone. . . . Here, as downtown [at the White House], there is a sense of urgency, of consideration of the national interest."

Yet Johnson was not simply a selfless patriot. As one official at the Defense Department said, "No sooner had Sputnik's first beep-beep been heard--via the press--than the nation's legislators leaped forward like heavy drinkers hearing a cork pop." The facts emerging from Johnson's investigation demonstrated the Eisenhower administration's ineptness in mounting an effective missile and space program. It also allowed LBJ to identify himself as the country's leading congressional advocate of a stepped-up effort in space. He dominated the hearings, introducing witnesses, leading cross-examinations, and making himself the principal spokesman to the press. In January 1958, he told the Senate Democratic caucus that "control of space means control of the world" and urged his party colleagues to sign on to a greatly expanded space effort. Later that month, at the conclusion of the hearings, he persuaded his subcommittee to issue seventeen recommendations that, without being overtly partisan, showed Johnson and the Democrats as pushing the Eisenhower administration into what they thought essential for the national well-being.

The journalists Rowland Evans and Robert Novak described Johnson's handling of the Sputnik crisis as "a minor masterpiece." Without involving himself in a direct collision with the president, Johnson used the space issue to damage the White House and benefit himself and the Democrats. Yet at the same time, he served the nation by propelling it into the space age. Specifically, he took the leading role in Congress in

sponsoring legislation to create a National Aeronautics and Space Administration (NASA). Although Johnson's aides did much of the work on the space bill, he played a significant part in shaping NASA's organization. While understanding that the military would have a large say in any space program, he argued successfully for making NASA a civilian agency. It would avoid service rivalries and satisfy political demands for peaceful uses of space. "The space program was a paramilitary operation in the cold war, no matter who ran it," historian Walter A. McDougall says, but civilian control headed off a significant imbalance between the services and met the political needs of American officials at home and abroad.[1]

The Vice President as Space Tsar

Johnson's election to the vice presidency in 1960 gave him a continuing role in space policy. This defied the tradition of consigning a vice president to the outer fringes of power. The office of vice president, Thomas R. Marshall, Woodrow Wilson's V.P. said, "is like a man in a cataleptic state. He cannot speak. He cannot move. He suffers no pain. And yet--he is conscious of all that goes on around him." "The chief embarrassment in discussing his [the vice president's] office," Wilson wrote, "is that in explaining how little there is to be said about it, one has evidently said all there is to say." Johnson, who had a life-long aversion to being anything but top dog, later described the vice presidency as "nothing," saying "I detested every minute of it." Daniel Patrick Moynihan remembered

looking into Vice President Johnson's eyes and thinking, "This is a bull castrated very late in life."[2]

Though Johnson's vice presidency was largely a ceremonial job, he played a part in space matters that went beyond what a vice president normally did. In 1961 President Kennedy persuaded Congress to amend the 1958 space law to make the vice president, instead of the president, the chairman of the Space Council, an advisory group that President Eisenhower had largely ignored between 1958 and 1961. Kennedy had no intention of letting Johnson eclipse him on a matter given high public visibility by Soviet space shots, but he was eager to use Johnson's expertise on something of vital national concern. Moreover, in giving Johnson some prominence as an architect of America's space program, JFK was making him a political lightening rod. Should an effort to catch and pass the Soviets in space technology fail or suffer a well publicized defeat, LBJ would be out front taking some, if not much, of the heat.[3]

Yet Johnson eagerly accepted the risk. He saw American achievements in space as vital to the Cold War contest with the Soviet Union. The Soviets' more advanced space program in 1957-1961 persuaded Kennedy, Johnson, and millions of Americans that they were not only falling behind in missile technology, but also in the global competition for "hearts and minds."

Consequently, in April 1961, after a Soviet cosmonaut became the first man to orbit the earth and the failure at the Bay of Pigs had embarrassed the United States, JFK asked Johnson to make

"an overall survey of where we stand in space. Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to land on the moon, or by a rocket to go to the moon and back with a man? Is there any other space program which promises dramatic results in which we could win?" Johnson replied that the Soviets were ahead of us "in world prestige attained through technological accomplishments in space." And other nations, identifying space gains as reflections of world leadership, were being drawn to the Soviets. A strong effort was needed at once to catch and surpass the Russians if we were to win "control over . . . men's minds through space accomplishments." Johnson recommended "manned exploration of the moon" as "an achievement with great propaganda value." "The real 'competition' in outer space," he said, was between the Communist and free enterprise social systems. The control of outer space was going to "determine which system of society and government [would] dominate the future. . . . In the eyes of the world, first in space means first, period; second in space is second in everything." When people complained about the cost of space exploration, Johnson replied: "Now, would you rather have us be a second-rate nation or should we spend a little money?"[4]

Kennedy needed no prodding from Johnson to make the case for some dramatic space venture. At the end of May 1961, he told a joint session of Congress: "If we are to win the battle that is now going on around the world between freedom and tyranny, the

dramatic achievements in space which occurred in recent weeks [a sub-orbital flight by astronaut Alan Shepherd] should have made clear to us all . . . the impact of this adventure on the minds of men everywhere, who are trying to make a determination on which road they should take. . . . Now it is . . . time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on earth." Kennedy asked the country to commit itself to the goal of landing an American man on the Moon and returning him safely to earth before the decade was out.[5]

Yet Kennedy worried that a highly publicized American space effort that ended in failure would further damage the nation's prestige and inflict a political wound that could jeopardize his hold on the presidency. Shepherd's flight had encouraged Kennedy's hopes that America might catch and pass the Soviets, but he remained concerned about future mishaps. In June, when Shepherd drove with the President, LBJ, and Newton Minow, head of the Federal Communications Commission, to speak before the National Convention of Broadcasters, Kennedy poked Johnson and said: "You know, Lyndon, nobody knows that the Vice President is the Chairman of the Space Council. But if that flight had been a flop, I guarantee you that everybody would have known that you were the Chairman." Everyone laughed, except Lyndon, who looked glum and angry, especially after Minow chimed in: "Mr. President, if the flight would have been a flop, the Vice President would have been the next astronaut."[6]

The possibility that he would be a sacrificial political lamb for a faulty space effort did not dampen Johnson's enthusiasm for a manned mission to the Moon. His commitment partly rested on his faith in liberal nationalism, the ability of government to assure economic and social progress through the use of its largesse. For Johnson, whose whole career had been built on the assumption that federal monies well spent on infrastructure, social programs, and defense, could serve the national well-being, but especially in the less affluent South, the space program was a splendid way to serve the country's defense, expand the domestic economy, and advance scientific understanding. In 1963, when criticism from academics, journalists, and political conservatives began to be heard against "the moon-doggle," Johnson told Kennedy: "The space program is expensive, but it can be justified as a solid investment which will give ample returns in security, prestige, knowledge, and material benefits." During a plane trip as vice president to visit various space installations around the United States, Johnson gave "a very impassioned talk" to Newton Minow for about an hour on the virtues of communications satellites in advancing education in underdeveloped countries and educational television in the United States.[7]

Johnson also saw other, more selfish benefits flowing from the space program. Convinced he was backing a winner, he made strong efforts to identify himself with every aspect of its work. Not only did he crisscross the country in publicized visits to

space installations, he also gave a series of "factual space reports to the public" on the work of NASA and his space council. The ostensible objective was to educate the country but it had the added advantage of keeping his name in the news.[8]

Then there were the pork-barrel gains that served the economic interests of Texas and the South and strengthened his political hold on the state and the region, especially at a time when his support of civil rights for blacks was undermining it. Although he denied any part in the selection of southwestern companies receiving Apollo or Moon program contracts or in shifting half of space operations from Cape Canaveral in Florida to a command center in Houston, Senator George Smathers knew better. "He and I had a big argument about it, big fight," Smathers says. ". . . Johnson tried to act like he didn't know. . . . It never has made sense to have a big operation at Cape Canaveral and another big operation in Texas. But that's what we got, and we got that because Kennedy allowed Johnson to become the theoretical head of the space program." Indeed, with Robert Kerr of Oklahoma, a Johnson friend, running the Senate Space Committee; Texas Congressmen Overton Brooks and Olin Teague the House counterparts; Albert Thomas, another Texas representative, chairing the Appropriations Committee; and James Webb, Johnson's nominee, directing NASA, the southwest generally and Texas in particular profited most from Kennedy's accelerated space program.[9]

In 1962, when lobbyists and Congressmen from outside the

South began to complain about a southwest monopoly on NASA contracts, Kennedy made Richard L. Callaghan, a congressional staffer, an assistant administrator to Jim Webb. Callaghan's job was to arrange for a more equitable distribution of contracts, which would relieve congressional pressure on Kenny O'Donnell, JFK's liaison to Congress, and find out whether Kerr and Johnson were pulling strings for their friends at NASA. As Callaghan later told Robert Sherrod, a Time-Life reporter: "'Kenny O'Donnell wasn't only interested in getting the contractors off his back. He wanted to satisfy himself about the Kerr-Johnson influence on the Space Agency. He wanted to find out who was getting what--wanted to satisfy himself that the organization was honest.' VERY INTERESTING," Sherrod wrote in a note to himself. "OBVIOUSLY JFK PUT O'DONNELL UP TO PLANTING CALLAGHAN, BUT HOW TO PROVE THAT THE PRESIDENT WAS SUSPICIOUS OF THE BIGGEST TEXAS WHEELER DEALER OF THEM ALL, AND OF THE 'KING OF THE SENATE,' WHO SUCCEEDED HIM AS CHAIRMAN OF THE SPACE COMMITTEE?" According to what Sherrod later learned from O'Donnell, there was no evidence to prove any wrongdoing by any one at NASA. Nor could they find anything on LBJ that might have made him a potential liability to the Kennedy administration. As Johnson himself later put it, "the damn press always accused me of things I didn't do. They never once found out about the things I did do."[10]

Johnson's thousand days as vice president justifiably enhanced his reputation as someone who saw substantial national benefits flowing from an expanded U.S. effort in space. It also

demonstrated his effectiveness in building a national consensus for a space program. As James Webb later told a BBC interviewer,

> When President Kennedy asked him [LBJ] to prepare a memorandum as to what our space programme should be, . . . he called in some businessmen. . . . Then he called in Wernher von Braun and General Schriever from the Air Force and a large number of technical people and sort of had hearings. As we approached the end of that, he called in the political leaders. . . . in Congress and he in effect said to them: 'We ought to go forward but we don't want to go forward unless you are going to commit yourself to stay with us.' . . . So he developed this commitment of certain leaders . . . and this you see made it a lot easier for the rest of the country to come along. They saw that these very powerful, responsible people, both political people in the Congress and business people from outside, believed this should be done, then we will accept it and go forward.[11]

A Space Advocate in the White House

During his first year in the White House, from November 1963 to November 1964, Johnson pushed hard to keep the space effort on track. Although determined to keep his first budget under $100 billion in order to win passage of JFK's $11 billion tax cut pending before Congress, Johnson agreed to increase NASA spending by $150 million to $5.25 billion. "Our plan to place a man on the moon in this decade remains unchanged," he told the Congress in January 1964. "It is an ambitious and important goal. In

addition to providing great scientific benefits, it will demonstrate that our capability in space is second to no other nation's." But, he emphasized, "we cannot reach this goal without sufficient funds. There is no second-class ticket to space.[12]

At the same time, Johnson's decision to press ahead with Apollo--the U.S. Moon landing--rested less now than in 1961-63 on considerations of national security. In May 1963, he had declared: "I do not think this generation of Americans is willing to go to bed each night by the light of a Communist moon." During the first year of his presidency, he remained eager to beat the Soviets in the space race, but a U.S. missile buildup under JFK, Kennedy's success in the Cuban Missile Crisis in 1962, and the Nuclear Test Ban Treaty in 1963 had eased concerns about a missile gap and fears that we had fallen behind the Soviets in military might and scientific research. Kennedy himself had intended to say on the day of his assassination "that there was no longer any fear that a Communist lead in space would become the basis of military superiority."[13]

Some worries about these matters remained, but during the first half of 1964 Johnson put greater emphasis on working out cooperative agreements with Russia to explore outer space. "President Johnson has apparently lost his enthusiasm for the Soviet-American space race," the New York Herald Tribune reported in June of 1964. Earlier in the year, the President had sent the deputy administrator of NASA, Hugh L Dryden, to Geneva "to seek

agreements for a 'widening area' of cooperation in space with Moscow." Judging from National Security Action Memoranda in 1964, Johnson was clearly eager for less competition and more cooperation with the USSR in space. As the astronaut and later Senator John Glenn saw it, the Congress was no longer so easily moved to increase space spending by appeals to the Soviet threat. "The anti-Russian theme had worn out," Glenn says. Johnson, ever sensitive to congressional moods, saw the need to press the case for space exploration on other grounds.[14]

A more compelling consideration with Johnson; especially at the start of his presidency, was to carry out John F. Kennedy's agenda. Johnson had to confront the grief and despair many people felt over the assassination of a beloved leader and their antagonism toward someone who, however much he might identify himself with JFK, seemed like a usurper, an unelected, untested replacement for the man the country now more than ever saw as more suitable for the job. In the first days of his presidency, only 5 percent of the public felt they knew very much about LBJ, while 67 percent said they knew next to nothing about him. Seventy percent of the county had doubts about how it would "carry on without" Kennedy. Seeing an essential need for continuity, for reassurance that the new president would be faithful to the previous administration's ends and means, Johnson made the fulfillment of Kennedy's promise to put a man on the Moon and safely return him to earth by 1970 one of his major priorities.[15]

Apollo: A Great Society Initiative

Johnson also believed that the Apollo mission made excellent economic and political sense. Landing a man on the Moon would not only reaffirm America's superiority over Russia and honor JFK's memory it would also spur both immediate and long-term economic growth and gain the administration considerable political credit with the public. Less than a month after becoming president, Johnson was pressing NASA to use its resources to help Wisconsin and Minnesota expand "their research and engineering capabilities." Webb, who was a good politician in his own right and understood perfectly the importance of tying NASA to specific economic benefits around the country, laid plans to double NASA's "activity" in both states. More important, he kept close track of how NASA affected the nation's economy and took every opportunity to apprise Johnson of these gains. In a 1965 report to the president, for example, he pointed out that in the previous year 94 percent of NASA's "procurement dollars" had gone to 20,000 private U.S. industrial companies: $331 million had been spent in 120 cities in 22 states with high unemployment rates; and as many as 750,000 people worked directly or indirectly on NASA-related business.[16]

Johnson understood that much more than pork barrel spending would result from NASA's efforts generally and the Apollo project in particular. To be sure, as a seasoned politician with a keen appreciation for federal largess, he greatly valued the economic and political gains coming to localities and his White House from

NASA spending in Florida, Alabama, Texas, Oklahoma, California, and other states around the country. But he also placed considerable value on the longer-term national advances NASA's work seemed likely to produce. As Webb told him, NASA's accomplishments were leading to the development of "new materials . . . new structures" as well as "complex electronic, mechanical and chemical systems. . . . This new technology . . . is bringing with it revolutionary change in the way of making and testing things, not only for space systems, but for innumerable other non-space services, processes and materials."

Because these benefits were essentially abstractions, Webb took pains to enumerate the many more concrete returns flowing from NASA's research and development. He told Johnson: NASA has something to offer law enforcement in terms of data processing and communication systems; to the construction industry through NASA developed materials; to pollution control through the development of an outlook whereby the Earth's air and water are beginning to be viewed as finite resources operating as closed systems; to transportation of people in and out of the inner city through research on short-haul aircraft; to improvement of economic opportunities for all citizens by stimulating business through new inventions and transfers of space technology to industry; and to a richer life by development of techniques making possible cheaper, lighter, and more reliable television sets and other electronic items for use

in the home.[17]

For Johnson, the work of space exploration was part of a larger vision he enunciated in May 1964 called the Great Society. In a speech at the University of Michigan, he appealed to the best in the American temperament. "For a century," Johnson said,

> we labored to settle and to subdue a continent. For half a century we called upon unbounded invention and untiring industry to create an order of plenty for all of our people. The challenge of the next half century is whether we have the wisdom to use that wealth to enrich and elevate our national life, and to advance the quality of our American civilization. . . . For in your time we have the opportunity to move not only toward the rich society and the powerful society, but upward to the Great Society. . . . It is a place where men are more concerned with the quality of their goals than the quantity of their goods.

To reach this promised land, Americans would have to pledge themselves to a crusade for excellence. "For better or for worse, your generation has been appointed by history . . . to lead America toward a new age," he said. "Will you join in the battle to build the Great Society, to prove that our material progress is only the foundation on which we will build a richer life of mind and spirit?"[18]

"An obvious component of this [Great Society] theme," a White House aide told Edward Welsh of the Space Council, "is the vast array of implications of our present Research and

Development activity." Jim Webb understood perfectly what LBJ had in mind: "I know of no area," he told the president, "where the inspirational thrust toward doing everything required of a great society can be better provided on a proven base of competence, and with so many practical additional benefits to be derived, than through the space program. . . . The space program lies in your first area of building the great society, for it is truly an imaginative new program based on new ideas and new capabilities." Early in 1965, after becoming vice president, Hubert Humphrey echoed Webb's point in a speech at the Goddard Memorial Dinner:

> Let me assure you that the Great Society envisioned by President Johnson is not one limited to the fight against poverty, ignorance, disease, and intolerance. The Great Society requires, in addition, an urgent quest for excellence, for intellectual attainment, for crossing new frontiers in science and technology. Let me emphasize that an adequately funded, well-directed space program is an integral part of our nation's commitment to its future, to its greatness.[19]

Johnson himself told a group of astronauts in 1965 that their missions not only increased "our knowledge of technology" but also would lead "to a better life for all." In a 1969 interview, Johnson said that plans to get to the Moon inspired the country to do something about its educational systems, medical care for the elderly, conservation, and poverty. In his

1971 memoirs he wrote: "Space was the platform from which the social revolution of the 1960s was launched. We broke out of far more than the atmosphere with our space program. . . . If we could send a man to the moon, we knew we should be able to send a poor boy to school and to provide decent medical care for the aged. In hundreds of other forms the space program had an impact on our lives." A few of the benefits he saw the country reaping from investments in space included pacemakers for heart patients, intercontinental television, lightweight electronics equipment to improve navigation techniques for ships and planes, more abundant food supplies, improved conservation of natural resources, and weather control capabilities which saved lives and crops and cattle.[20]

If space exploration tied into LBJ's hopes for a Great Society, it also served his political purposes in the 1964 presidential campaign. Johnson's opponent, conservative Arizona Senator Barry Goldwater, complained that "We are spending entirely too much money on the manned moon program." He promised that as president he would have "all manned space research . . . directed by the military," and would use the "billions of dollars saved from abandoning the manned lunar program" for "military space missions." As with so many other issues in the campaign, Goldwater was out of sync with the national mood. Polls in the spring and fall of 1964 showed between 64 and 69 percent of the public favorably disposed to landing an American on the Moon, with 78 percent saying the Apollo program should be maintained at

its current pace or speeded up. Only 20 percent of the country supported space spending strictly for military purposes. In response, Johnson refused "to slacken in our nationally approved effort to reach the moon as soon as we can." Identification with the widely backed Apollo mission was superb politics in an election year.[21]

LBJ and the Budget Crisis

At the same time Johnson gave wholehearted support to Apollo, he thought about what, if any, big projects might come next. In January 1964, he asked Webb to describe NASA's future plans, specifically asking how "hardware and development programs" would be tied to "prospective missions." Webb provided a tentative answer in May, in which he said that NASA had "virtually completed the investment in facilities" that would land astronauts on the Moon and "meet a broad range of not yet specified tasks." These might include a greater mastery of space science, which would improve weather prediction and control; exploration of the Moon to expand our understanding of the origins of the solar system; a search for life on other planets; the development of space stations, manned and unmanned; better weather, communications, and navigation satellites; and exploration of the near planets and probes of more distant ones.

It wasn't until February 1965, however, that Webb gave the president a more precise statement of NASA's future plans. Sensing that Johnson, with expanding commitments at home and abroad, was not eager for new big spending on space, Webb backed

away from most of the proposals he had identified in his May 1964 letter. Instead, he urged commitments to two modest programs: the exploration of Mars through an unmanned landing and further exploration of the Moon with the technology developed for Apollo. The distinguishing features of the Webb proposals, an aide told LBJ, was the absence of a request for any "major new launch vehicle systems" and a continuation of NASA funding at current levels.[22]

With Apollo still years away from fulfillment, Johnson was unwilling to make any new commitments of any kind. When Webb asked permission to give the chairmen of the House and Senate space committees copies of his February letter to inform the Congress about possible future NASA projects, Johnson resisted. "Why do we need to do anything?" he asked in a reply to Jack Valenti, his aide handling the matter. "I would think I would have more leeway & running room by saying nothing[,] which I would prefer."[23]

Beginning in 1965, Johnson took a two-track approach to NASA and space exploration. His only priority was landing a man on the Moon by the end of the decade, as Kennedy and he had promised. Beyond that, he resisted significant commitments to post-Apollo planning that would cost billions of dollars and engage the country's prestige and energy. One of the striking features of Johnson's memoirs on his presidency is that he devotes only seventeen out of six hundred pages to a discussion of space. And of those seventeen pages, only three describe

space policy during his presidency. The rest focuses on his Senate and vice presidential years, the period 1957-1963, when he felt he had done his most important work for the space program. Indeed, in an interview with Walter Cronkite in 1969, Johnson said: "Very frankly, I think I spent more time in the space field in '57 and '58 and '59 and '60, and up to '63, than I did after I became President."[24]

This is not to say that Johnson lost interest in space achievements. He closely attended to the various space missions between 1965 and 1968. As Ed Welsh remembered, Johnson watched each mission on television. "He had the astronauts in to see him at the White House. He had them to the ranch. He followed them with a real sense of personal interest. As a matter of fact, he said that he really in a sense flew with them on every flight from the beginning of the launch till they landed safely." LBJ himself told Cronkite: "I have ridden on every mission. . . . I've watched with eagerness, and pride, their every movement."[25]

Nevertheless, his interest didn't translate into support for post-Apollo projects. Everything that had initially spurred Johnson to back a major American effort in space--fear of Soviet superiority and a desire for economic and political gains--now became reasons to avoid substantial commitments to new big space programs. Johnson's concern, for example, that Soviet advances in space might undermine America's national security and prestige in the Soviet/American competition for global influence steadily faded from view during his presidential years. In the spring of

1966, after the Soviets had landed an unmanned spaceship on the Moon, Jim Webb pressed the president to use the Soviet feat to extract more money for NASA from Congress. Webb told LBJ that he had done his best to "minimize the political risk to your Administration from the fact that we are operating substantially under what would be the most efficient program." This was Webb's way of warning that the Soviets might beat the U.S. to the Moon, for which Johnson would pay a high political price.[26]

But Johnson was not impressed. He had justifiable confidence that the U.S. would land men on the Moon ahead of the Soviets, and he was confident that Moscow was now more eager for cooperation than competition with the United States in space. Indeed, nine days before Webb's warning about the continuing Soviet threat to America's leadership in space, LBJ had issued "a statement outlining the essential elements of a celestial bodies treaty" and asked U.N. Ambassador Arthur Goldberg to initiate discussions. During the next three months, Soviet/American negotiators drafted nine initial articles of an outer space treaty. By December, additional points of agreement were incorporated into the treaty, which Johnson now publicly described as the "most important arms control development since the Limited Test Ban Treaty of 1963." The treaty, which was signed in January 1967 and entered into force in October, banned the placing of weapons of mass destruction in orbit, in outer space, or on celestial bodies; established an unconditional commitment to assist and return astronauts who landed in another

country; and forbad claims of sovereignty over celestial bodies.[27]

To Johnson and the State Department, the agreement meant a "de-fusing of the space race" and a reduction or even an end to "much of the pressure to race for new and distant goals." Henry Owen of the Department's Policy Planning Council anticipated "strong opposition" from NASA and the Space Council to additional cooperation with the Soviets in space, because it would mean less funding of post-Apollo projects. More cooperation with Moscow and less ambitious space plans, Owen told Walt Rostow, Chairman of the Policy Planning Council, "will save money, which can go to (i) foreign aid, (ii) domestic purposes--thus mitigating the strain of the war in Vietnam." Owen urged Rostow to get into the fight with NASA and to enlist "someone on the domestic side of the White House staff . . . to ensure that someone, . . . representing the constituency whose interests are most directly affected, gets into the fight." A State Department paper on "Space Goals After the Lunar Landing" argued that by deemphasizing or stretching out "additional costly programs aimed at the moon and beyond, resources may to some extent be released for other objectives--foreign aid, domestic needs, scientific efforts in other areas--which might serve more immediate, higher priority U.S. interests."[28]

Johnson agreed. The increasing costs of fighting in Vietnam, which began to expand rapidly in 1965, and the outlays for the antipoverty and Great Society programs, which also made

substantial demands on the budget beginning in 1965, were central considerations in making Johnson resistant to post-Apollo commitments. In July 1969, at the end of his Administration and after the successful Moon landing, Johnson was vague and evasive about post-Apollo plans. "What would you like to see as the next space goal?" an interviewer asked him. "I don't want to be setting goals for those that are responsible for this effort," he said. "I would like to take all that we had done and be sure that we utilize all the knowledge that we have gained up to now, and to follow through to milk the entire Apollo program of every benefit that can come from it." Johnson then ticked off the various ideas others had for post-Apollo planning: space stations, additional Moon shots, studies in space medicine, and unmanned trips to other planets. Personally, he would not say what he favored, but hoped that we would continue to have a vigorous space program.[29]

Johnson's remarks were symptomatic of his refusal to make significant, large-scale commitments beyond Apollo in his 1967-1969 budgets. His rhetoric masked the battles he and Webb had fought over funding for NASA's future. After suffering a modest cut of about $75 million from 1965 to 1966, Webb was determined to increase NASA's funding in 1967. But Johnson wouldn't hear of it. Webb's request for $5.3 billion could not withstand a $300 million reduction. In accepting the president's cut, Webb warned against keeping NASA's funding at the current level for another year. "The 1968 budget will be a major turning

point with indicated requirements on the order of $6 billion of new obligational authority," he told Johnson in May 1966. By August, however, it was clear that Congress and the president would drop NASA's funding below $5 billion for fiscal year 1967. This would "leave no choice," Webb warned Johnson, "but to accelerate the rate at which we are carrying on the liquidation of some of the capabilities which we have built up." He predicted that options would now be foreclosed and doubt and uncertainty would demoralize NASA. And, he bluntly declared, "There has not been a single important new space project started since you became President. Under the 1968-guidelines very little looking to the future can be done next year. . . . I cannot avoid the feeling that this is not in the best interests of the country."[30]

Johnson relied on his Budget Director, Charles Schultze, to counter Webb's assertions. Schultze argued that NASA's funding was entirely adequate to meet the 1969 deadline for a Moon landing and to work toward more distant goals like a Mars landing and/or earth orbital stations. After all, "the space program is not a WPA," Schultze declared. Nor did he or Johnson feel that NASA's budget was skimpy alongside of $2 billion in spending on elementary and secondary education, $1.8 billion on the poverty program, $200 million on water pollution control, and $25 million for high-speed ground transportation. A $5 billion space budget or even a little below that would not "wreck the space program," Schultze said, nor would it lead to "the liquidation of some of

the capabilities we have built up." NASA's funding did not represent "a lack of it; support for the space program." Schultze did not see how in the context of the fighting in Vietnam the administration could afford to meet Webb's request. Johnson agreed with Schultze and convinced Webb publicly to back his decision, though privately the NASA administrator continued to press his case, unsuccessfully asking for an additional $182 million above the $455 million slated for post-Apollo planning.[31]

Johnson saw little political risk in turning aside Webb's demands for more money. By the end of 1966, it was clear to him that NASA and space exploration beyond the Apollo landing had diminished popular appeal. By the summer of 1965 a third of the nation favored cutting the space budget, while only 16 percent wanted to increase it. Over the next three and a half years the number for cutting space spending went up to 40 percent, with those preferring an increase dropping to 14 percent. A poll taken in the summer of 1969 recorded 53 percent of the country was opposed to a manned mission to Mars. At the end of 1967, the New York Times reported that a poll conducted in six American cities showed five other public issues holding priority over efforts in outer space. Residents of these cities preferred doing something about air and water pollution, job training for unskilled workers, national beautification, and poverty before spending federal funds on space. The following year Newsweek echoed the Times story, stating: "The U.S. space program is in decline. The Viet Nam war and the desperate conditions of the

nation's poor and its cities--which make space flight seem, in comparison, like an embarrassing national self-indulgence--have combined to drag down a program where the sky was no longer the limit."[32]

The Congress as well was strongly disposed to reduce NASA's budget. A White House survey of congressional leaders at the end of 1966 revealed pronounced sentiment for keeping Apollo on track, but for cutting NASA spending by skimping on post-Apollo outlays. In this context, a Johnson request in January 1967 for a $5 billion NASA budget for fiscal 1968, including $455 million for post-Apollo programs, was pretty bold.[33]

Yet Johnson's inclination to be generous with NASA and provide for a modest amount of post-Apollo spending could not withstand a disastrous fire in an Apollo command module in January 1967 and a growing budget deficit spurred by the fighting in Vietnam. On January 27, a fire destroyed the module and killed astronauts Roger B. Chafee, Edward H. White III, and Virgil I. Grissom during a test at Cape Kennedy. In addition to the tragic loss of life, the fire undermined national confidence in NASA, which was now accused of carelessness in trying to move the Apollo project forward too quickly. The fire, Johnson said later, represented "an all-time low" for the space effort. "I grieved [not only] for the men and their families but [also] . . . for the space organization. I felt very sad and sorry for Jim Webb and all of his loyal employees." Senate hearings raised questions about a great many defects in the spacecraft and

brought Webb into sharp conflict with three Senators, who saw him as whitewashing NASA's failings. The New York Times, which was also highly critical of Webb, said that NASA stood for "Never a Straight Answer." Though the hearings were "unpleasant and embarrassing for NASA; . . . on the whole," an administrative history of the agency asserts, "they gave NASA a sympathetic forum in which to explain how a tragedy had come about, and show how it would serve to correct deficiencies." NASA's forthrightness in responding to the failings that produced the fire restored a measure of confidence in the agency and prompted the Senate committee to recommend that NASA continue to move the Apollo program forward to achieve its goal.[34]

A federal budget crisis in the summer of 1967 dealt NASA another blow. A $29 billion deficit brought on by Vietnam spending persuaded Johnson to ask the Congress for a 10 percent increase in income taxes. To persuade Congress, LBJ felt compelled to match the tax increase with spending cuts applied to fiscal year 1968 beginning in October 1967. NASA was targeted for $500 million in reductions. Webb objected that with NASA "just now getting back up to speed after the interruptions and difficulties associated with the accident," it would be "the straw that break's the camel's back," meaning, "the momentum we have achieved will be lost." For Johnson, there was no choice, except where to apply the cuts in NASA programs. As before, despite recommendations to the contrary, he stuck to keeping Apollo on schedule, agreeing instead to center cuts on

post-Apollo applications and the unmanned landing on Mars. Once again, Webb and NASA had to accommodate themselves to a reduced budget, now, $4.59 billion. In spite of everything, Webb was still able to assure Johnson that "the goal of the manned lunar landing in this decade is preserved."[35]

The cuts genuinely troubled Johnson. Whenever there were reductions, he would tell Webb, "Next year I hope to make up for this." Johnson "had almost supreme confidence that at some point he could give us resources again and that we could catch up," Webb recalled. More specifically, in a message to Webb in September 1967, the president asked him to "be sure to make abundantly clear [to a congressional committee] that I do not choose to take one dime from my budget for space appropriations for this year." The "Congress forced me to agree to effect some reductions or lose the tax bill." While Johnson's message was partly a case of political finger-pointing, he was truly uncomfortable reining in NASA or any government program he believed served the national well-being. He loved to quote Speaker Sam Rayburn's adage: "Any jackass can kick a barn down, but it takes a good carpenter to build one." More to the point, his whole political career had been given over to building and using government programs to expand the economy, raise living standards, relieve privation, and build his Great Society. Overreaching himself by trying to institute domestic reforms and fight a war at the same time, he could not find the means simultaneously to spend on guns and butter. It was a reality he

found difficult to accept.[36]

Jim Webb also struggled against the reality of declining commitments to NASA. In November 1967, he pressed Budget Director Charles Schultze to urge a strong statement by the president about NASA funding when signing its appropriation bill. NASA's congressional backers, Webb said, saw the president as having "'knifed' the very activities he had previously been urging them to support." LBJ's inconsistent leadership, Webb added, had created "bitter feelings . . . in a number of quarters." Webb wanted Johnson to emphasize the continuing Russian danger to American preeminence in space and to say: "Although we will at this time have to postpone important parts of our space program, let this fact be clear: We are fixed in our resolve to master the challenge of space."[37]

LBJ and Webb

Yet nothing Johnson said could change the reality of shrinking budgets and enthusiasm for space exploration after Apollo. A New York Times story in April 1968 stated: "After a heady decade of uninterrupted hiring, building and dreaming great dreams of farreaching exploration, the American space program is gearing down to a slower pace and a less certain future. . . . The growing feeling in the space establishment that once astronauts have landed on the moon, they will have no other place of significance to go for several years because of sharp budget cuts. These cuts have trimmed to the bone all preparations for future missions. It is as if the astronauts are heading for a

dead-end on the moon." By September, after the White House had proposed to reduce NASA spending another quarter of a billion dollars and congressional appropriations committees penciled in only $3.99 billion for NASA in fiscal year 1969, James Webb resigned.[38]

There are conflicting accounts of the reasons behind Webb's departure. Webb himself claimed that he wanted to get out before the Apollo seven and eight missions, the manned orbits of the Earth and the Moon in the fall of 1968, so that he could respond to any failure by going after critics in and out of the Congress. Others say that Webb was surprised when Johnson accepted his resignation. According to these accounts, Webb had used the threat of resignation repeatedly with the president as a way to press NASA's case. On September 16, 1968, however, Johnson, who had gotten "fed up with this same old story," took Webb up on the offer, saying, "Let's call in the press."[39]

Whatever the realities behind the decision, Webb tried to turn his resignation to NASA's advantage. At a press conference on September 16, he "bitterly" complained that "Congressional budget cuts had put the United States second in the space race" behind the Russians. Though he denied that he was leaving because of reductions totaling $1.4 billion over the last four years, he nevertheless said that "the agency had been used 'as a sort of whipping boy' by Congress and other agencies competing for Federal funds. And he made it clear that he felt the U.S. is still behind the Soviet Union in space, and that the reason for

this second place is a lack of funds." Sources told the Washington Post that "Webb was discouraged by the budget cuts, tired of fighting to have Congress restore them and even wearier of debating the urgency of the space program with the Bureau of the Budget and President Johnson."[40]

Webb's public comments provoked an angry response in the administration. Donald F. Hornig, the President's Science Advisor, sent Johnson a memo describing Webb's assertions as "unconscionable statements," which "were undoubtedly motivated" by NASA's "budgetary problems." Hornig disputed assertions that the Soviets had "'a capability that could change the basic structure and balance of power in the world,' that the U.S. was clearly second in space and that a Soviet manned lunar landing could be achieved in the next year--a time scale that is competitive with, or ahead of Apollo." Hornig thought the U.S. was at least a year ahead of the Russians and, if the president agreed, he wished to press Webb and others at NASA to set the record straight. Ed Welsh at the Space Council also felt that Webb's estimate of Soviet space capabilities was "inaccurate" and that the U.S. missions in space had demonstrated our preeminence.[41]

Johnson sided with Webb, inviting him to respond to Welsh and telling his aides to instruct Hornig not to get into the NASA debate. In a response to Hornig's memo, Johnson said: "Drop it! That is my feeling, but get Jim Webb to get me a prompt reply--all his scientists--all his private ones--to support him

and me." In a written memo to Hornig, which Johnson wanted conveyed only on the phone, the president said: "It is hard for me to believe that Jim Webb would make 'unconscionable statements' or be 'motivated' entirely by budgetary problems." Johnson defended Webb's concern that "the trend of the Soviet program upward and the U.S. program downward" might allow the Russians "to achieve both the image and reality of power and forward motion." Johnson warned Hornig that "even if your group should develop evidence to sustain their views, your report might be shortly followed by some tragic occurrence in the U.S. program or a major triumph in the Russian one. This would inevitably bring into question the judgment of your group in a way that might impair its usefulness." Johnson also identified himself with Webb's complaints about budget shortfalls, saying, "It was only with great reluctance that for the past two years I have taken action to meet the overall fiscal requirements laid down by a determined group in the Congress by accepting cuts made in the House Appropriations Committee."[42]

Webb's concerns were greatly exaggerated, as demonstrated by the successful Apollo 7 and 8 missions in September and December respectively. But Johnson backed him nevertheless. Partly, he had a warm feeling for Webb, who had served him so loyally for almost five years. And to Johnson, this was no small consideration. In February 1968, with the Tet offensive in Vietnam in full swing and the White House besieged by anti-war protests, Johnson talked to Thomas O. Paine about becoming deputy

administrator of NASA. As Paine recalls, Johnson stressed the problems faced by his administration, "how much he needed people to come into the government and shoulder part of this burden and relieve him of it, to serve him loyally, help him move the country ahead in these very difficult times." In addition, Johnson liked Webb and admired him. After a conversation with Webb about the Apollo fire, Johnson remembered telling Mrs. Johnson: "I know now why Jim Webb was an old Marine and a good one. He's got the courage. He goes through a disaster like this and he says, 'We just got to go on and do what we know is right' . . . And he did."[43]

But more than personal sentiment determined Johnson's support of Webb. He felt that the historical reputation of his administration was partly at stake. If Webb was right about the potential for renewed Soviet dominance in space, if Moscow beat the U.S. in the Moon race, Johnson believed that he and Webb would be seen as having presided over a failed or at least inadequate space program. By letting Webb beat up on Congress for shortchanging NASA, Johnson was preparing to point the finger at Congressmen and Senators for any retrospective weaknesses historians saw in the Johnson administration's space effort. Shortly after the Apollo 7 and 8 successes, when Johnson gave Webb NASA's Distinguished Service Medal and praised him as "the best administrator in the Federal Government," he was leaving no doubt that, unlike many in the Congress, he had been an ardent advocate of NASA generally and of Apollo in particular. Lyndon

Johnson wanted to be remembered as a president who made his mark in space.[44]

Conclusion

Johnson's historical reputation as a Senator, vice president, and president will never be more than marginally affected by his part in the development of America's space program. His initiatives as an "imperial president" will always identify Johnson more with domestic reforms like civil rights, Medicare, federal aid to education, and other war on poverty and Great Society measures than with Project Apollo. They will stand with the disaster in Vietnam as the centerpieces of his political career much more than his presidential goals in space. Nevertheless, in time, as the United States progresses into the space age and ever more important discoveries emerge about our universe, Johnson will stand in the front rank of those who had the foresight and determination, as well as the skill to use presidential power--in spite of its undeniable limitations--to initiate America's probe into the farthest reaches of outer space. For this driven, almost madly ambitious man from rural south central Texas, it may be fairly said that in his lifetime he both figuratively and literally reached for the Moon.

Notes

1. All this material is in Robert Dallek, Lone Star Rising: Lyndon Johnson and His Times (New York: Oxford University Press, 1991), pp. 529-34.

2. See Rowland Evans and Robert Novak, Lyndon B. Johnson: The Exercise of Power (New York: Random, 1966), p. 323; Doris Kearns, Lyndon Johnson and the American Dream (New York: Harper and Row, 1976), pp. 162-64; Arthur Schlesinger, Jr., Robert Kennedy and His Times (Boston: Little, Brown, 1978), pp. 622-23.

3. This material is drawn from Lyndon B. Johnson, The Vantage Point: Perspectives of the Presidency, 1963-1969 (New York: Random House, 1971), pp. 278-79; and chap. I, "The Most Insignificant Office," of Robert Dallek, "Splendid Misery: Lyndon Johnson and His Times, 1961-1973," unpublished manuscript.

4. JFK to LBJ, April 20, 1961; LBJ to JFK, April 28, 1961, President's Office Files, John F. Kennedy Library, Boston (hereafter cited P.O.F., JFK); Richard H. Nelson Oral History; Memorandum, n.d., but clearly 1961, beginning: "Despite all the heated public discussion . . . ", Office Files, George E. Reedy, Lyndon B. Johnson Library (hereafter cited as O.F. GER, LBJL); Walter A. McDougall, . . . the Heavens and the Earth: A

Political History of the Space Age (New York: Basic Books, 1985), 320; Edward C. Welsh Oral History (OH), JFKL.

5. McDougall, . . . the Heavens and the Earth, pp. 302-303.

6. Ibid., pp. 308-10; Newton Minow OH, LBJL.

7. JFK to LBJ, July 29, 1963; LBJ to JFK, July 31, 1963, White House Famous Names, (hereafter cited as WHFN), LBJL; Newton Minow OH; McDougall, . . . the Heavens and the Earth, pp. 322-23, 376, 389-96.

8. LBJ to Ed Welsh, July 26, 29, 1961; LBJ to Walter Jenkins, August 2, 1961; Welsh to LBJ, August 11, September 8, 13, 14, 1961; Welsh to Henson, October 9, 1961, Vice Presidential Papers (hereafter cited V.P.P.), LBJL.

9. George Smathers OH, Senate Historical Office, Washington, DC (hereafter cited as SHO); McDougall, . . . the Heavens and the Earth, pp. 361-63, 373-76.

10. Robert Sherrod telephone conversation with Richard L. Callaghan, January 28, 1971; Sherrod telephone conversation with Kenneth O'Donnell, May 13, 1971, Robert Sherrod Apollo Collection, NASA Historical Reference Collection, NASA Headquarters, Washington, DC. LBJ is quoted by Leo Janos in "The Last Days of the President: LBJ in Retirement," Atlantic, July 1971.

11. James Burke Interview with Webb, May 23, 1979, James Webb Papers, NASA Historical Reference Collection.

12. "Questions from Everett Collier re President Johnson's Attitude on Space," February 8, 1964, White House Central File: (hereafter cited as WHCF) EX\OS; Chapter II, 1-9, Administrative History of NASA, MSS, LBJL; Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," in The Johnson Years, Vol. II: Vietnam, the Environment, and Science, edited by Robert A. Divine (Lawrence: University Press of Kansas, 1987), pp. 233-34.

13. The LBJ quote is in Divine, The Johnson Years, II, 234; JFK's view is in chap. VII, 3, Administrative History of NASA, LBJL.

14. Stuart H. Loory, "U.S. Talking Down the Space Race," New York Herald Tribune, June 9, 1964; Charles Johnson to McGeorge Bundy, February 4, 1964; Bundy to LBJ, February 29, 1964; James Webb to LBJ, April 30, June 29, 1964; NSAM 285 and 288, National Security Files: National Security Action Memoranda (hereafter cited as NSF: NSAM), LBJL; Interview with John Glenn, October 18, 1968, RSAC, NASA Historical Reference Collection.

15. See Merle Miller, Lyndon (New York: Simon and Shuster, 1980), 410; Kearns, Lyndon Johnson, n. 3, p. 412; and Vaughn Davis Bornet, The Presidency of Lyndon B. Johnson (Lawrence: University Press of Kansas, 1983), p. 8.

16. James Webb to LBJ, December 20, 1963, WHCF:GEN:FG260:NASA; and Webb to LBJ, October 29, 1965, WHCF:EX:FG260, LBJL.

17. See the weekly NASA reports to LBJ from Edward C. Welsh for 1964 in WHCF:EX\OS, LBJL; and the Webb-LBJ Briefing, October 14, 1968, from which the quotes are drawn, James Webb Papers, NASA Historical Reference Collection.

18. Public Papers of the Presidents: Lyndon B. Johnson 1963-64, I (Washington, DC: Government Printing Office, 1965), pp. 704-707.

19. Horace Busby to Ed Welsh, May 13, 1964, White House Aides: Horace Busby Papers, LBJL; James Webb to LBJ, November 30, 1964; "Introductory Comments," November 12, 1965, quoting Humphrey's speech, March 19, 1965, LBJ Files, NASA Historical Reference Collection.

20. Divine, The Johnson Years, II, p. 235; Walter Cronkite Interview with LBJ, July 5, 1969, LBJ Files, NASA Historical Reference Collection; Johnson, The Vantage Point, pp. 285-86.

21. E.C. Welsh to LBJ, May 2, July 21, September 2, October 24, 1964, WHCF:EX\OS, LBJL; Divine, The Johnson Years, II, pp. 234-35.

22. LBJ to Webb, January 30, 1964; Webb to LBJ, February 16, 1965; Jack Valenti to LBJ, February 17, 1965, WHCF:EX\OS; Webb-to

LBJ, May 20, 1964; Charles S. Sheldon II to George Reedy, May 26, 1964, White House Aides: Bill Moyers Papers, LBJL.

23. Webb to Jack Valenti, March 30, 1965; Valenti to LBJ, March 30, April 1, 1965; LBJ's note is written in hand on Valenti's March 30 memo, WHCF:EX\OS, LBJL.

24. Johnson, The Vantage Point, pp. 270-86; Walter Cronkite Interview with LBJ, July 5, 1969, LBJ Files, NASA Historical Reference Collection.

25. Edward C. Welsh OH, July 18, 1969, LBJL; Walter Cronkite Interview with LBJ, July 5, 1969, LBJ Files, NASA Historical Reference Collection.

26. James Webb to LBJ, April 1, May 16, 1966, WHCF: Confidential File (hereafter referred to as CF):OS, LBJL.

27. See "Outer Space Treaty Chronology" in White House Aides: Joseph Califano Papers; and the materials for 1966-1967 in WHCF: Legislative Background: Outer Space History, LBJL.

28. Henry Owen to Walt W. Rostow, December 9, 1966; "Space Goals After Lunar Landing," October 1966, NSF: Subject Files, LBJL.

29. Walter Cronkite Interview with LBJ, July 5, 1969, LBJ Files, NASA Historical Reference Collection.

30. See Divine, The Johnson Years, II, pp. 238-40; James Webb to LBJ, May 16, 1966, WHCF: CF:OS; Webb to LBJ, August 26, 1966, WHCF: EX\OS, LBJL.

31. Charles L. Schultze to LBJ, September 1, 20, 1966, WHCF: EX\OS; James Webb to LBJ, December 17, 1966, WHCF: EX:FI4\FG260, LBJL; Divine, The Johnson Years, II, pp. 240-42.

32. The Gallup Poll: Public Opinion, 1935-1971, III: 1959-1971, pp. 1952, 2183-84, 2209; New York Times, December 3, 1967; Newsweek is quoted in Administrative History of NASA, chap. II, p. 48, LBJL.

33. For congressional opinion, see the survey made by Charles Schultze in Box 23 of WHCF: EX\FI4; LBJ's budget is described in Administrative History of NASA, chap. II, 17-19, LBJL.

34. Administrative History of NASA, chap. II, 47-52; Walter Cronkite Interview with LBJ, July 5, 1969, LBJ Files; Robert Sherrod Interview with Senator Clinton P. Anderson, July 25, 1968; Sherrod to John B. Oakes, May 24, 1972, RSAC; Eugene M. Emme Interview with Edward C. Welsh, February 20, 1969, all in NASA Historical Reference Collection.

35. James Webb to LBJ, July 10, 1967, WHCF:CF:Agency Reports:NASA; Webb to LBJ, August 10, 1967, WHCF:EX\FI4\FG200, LBJL; Divine, The Johnson Years, II, pp. 243-45.

36. James E. Webb OH, April 29, 1969, LBJL; LBJ's message to Webb is in Divine, The Johnson Years, II, pp. 244-45; the Rayburn quote is in Dallek, Lone Star Rising, p. 427.

37. James Webb to Charles Schultze, November 6, 1967, WHCF:EX FI4\FG260, LBJL.

38. New York Times, April 16, 1968; Divine, The Johnson Years, II, pp. 238, 245.

39. James E. Webb OH, April 29, 1969; Thomas O. Paine OH, March 25, 1969, LBJL; Memo on Thomas O. Paine by Robert Sherrod, August 25, 1970; Sherrod Interview with David Williamson, Jr., April 10, 1972, James Webb Folder, RSAC, NASA Historical Reference Collection.

40. Administrative History of NASA, Chap. II, pp. 34-37, 53-55, LBJL; Washington Post, September 17, 1968.

41. Donald Hornig to LBJ, September 26, 1968; Edward C. Welsh to LBJ, September 30, 1968, WHCF: EX\OS, LBJL.

42. James Webb to LBJ, October 1, 2, 5, 1968, answering Welsh; LBJ memo, n.d.; and LBJ memo to Donald Hornig, n.d., both attached to Larry E. Temple Memorandum for the Files, October 10, 1968, WHCF: EX\OS, LBJL.

43. Thomas O. Paine OH, March 25, 1969, LBJL; Walter Cronkite

Interview with LBJ, July 5, 1969, LBJ Files, NASA Historical Reference Collection.

44. LBJ's awards to and praise for Webb are described in Divine, The Johnson Years, II, pp. 246-47.

Chapter 4

The Presidency, Congress, and the Deceleration of the U.S. Space Program in the 1970s

by

Joan Hoff

Richard Nixon inherited many things from Lyndon B. Johnson's presidential administration; among them, the Vietnam War, the "Great Society" social reform effort, and the civil space program. In the 1960s all three experienced spiraling costs, as well as public disagreement of greater or lesser extent over their means and ends, and they all suffered both from managerial problems inside the government and exaggerated expectations by supporters. Each of these difficulties contributed to a growing public dissatisfaction about their purposes and costliness. As the smallest of these inheritances, the space program was the easiest to target for cuts by the new economy-minded administration because it had the least broad public constituency. Accordingly, each of the three U.S. presidents and three NASA administrators in the 1970s had to face budgetary and planning problems originating in the heyday of NASA's development in the 1960s.

By January 1969, when Nixon took office, NASA had already experienced a decline in funding from a peak of $5.25 billion in 1965 to $3.99 billion. The first lunar landings later that year did little to stave off additional funding cuts in future years.

In fact, the July and November moon landings probably contributed to, rather than diminished, the disillusionment felt by so many Americans about Project Apollo. The program, while technologically innovative and visually exciting, left much to be desired from most other vantage points. Many Americans felt little sympathy for the celebrities who became regular members of an elite audience at Apollo launches; or for astronauts promoting all types of business endeavors and marketing space memorabilia; or for NASA leaders who by 1968-1969 seemed to believe in the wake of the successful lunar missions that their agency deserved whatever funding it requested; or for rising taxes and a worsening economic situation that were exacerbated by these programs; or finally for a worried aerospace industry that stood to lose billions if the space program were cut. There were simply too many charges of "misplaced government priorities" and "misguided government allocations of funds" by 1969 for NASA to continue with business as usual.[1]

For all the blame that has been laid on the Nixon administration because of Watergate, one thing that he did was to move space technology away from being merely a political/military weapon in the cold war--as it had usually been since the successful Soviet launching of Sputnik I on October 4, 1957--toward a more balanced and deliberate effort that avoided international competition. He tried to downplay the cold war tensions that had done so much to make Project Apollo the vehicle for achieving international prestige and to return to the more

ordered approach of his 1950s mentor, Dwight D. Eisenhower.[2] Nixon--perceiving Eisenhower's worst fears about the creation of a "scientific-technological elite" that stressed engineering over science, competition over cooperation, civilian over military, adventure over applications--also tried to minimize what he viewed as the rise of technocracy in the American federal system.[3] The result was a deceleration of the rate of space exploration in the 1970s, an emphasis on scientific return, and a commitment to obtaining the most efficient space effort for the least expenditure of funds.

Even had Nixon been so inclined he probably could not have continued his predecessor's impossible dream of capturing outer space from the Soviets as a twentieth century equivalent to the road system of the Roman Empire and control of the seas by the British navy.[4] In fact, in an exuberant post-president interview with Walter Cronkite after the first moon landing, Johnson attributed the floodtide of social legislation that became the hallmark of his administration to the fact that the space program had begun it all by breaking down the resistance in the South among Democrats and Republicans alike to federally funded programs.[5]

Nixon, while not above wining and dining astronauts as American heroes to further his political purposes, never exhibited the personal enthusiasm or expansive commitment for the space program that Kennedy and Johnson had shown. This was probably in part because he did not need to use the space program

to prove himself in dealing with the Soviets as Kennedy and Johnson apparently thought they did. Moreover, he had inherited too many economic problems created by the massive spending programs launched in the name of the cold war in Vietnam and the Great Society. These programs, in response to crisis and division and a breakdown of the older political tradition, had gradually lost support among the public in the course of the 1960s. In a word, fighting the cold war and conducting a domestic reform program had become so expensive that the Nixon administration had no choice but to retrench.[6]

However, I do not agree with most space scholars that Nixon reduced the size of the space program primarily because of public disillusionment with high priced, high tech solutions that did not seem to resolve basic foreign or domestic problems such as the war in Vietnam and poverty and crime at home. Nixon was not one to bow to public opinion on foreign or domestic issues. There were other concrete reasons for the continued deceleration than national polls showing opposition to the expense of the manned space program,[7] or what NASA administrator James C. Fletcher called the "antitechnology kick" of the countercultural generation,[8] or even the antidemocratic overtones and cultural elitism of the technocratic approach to government introduced by the Kennedy administration.[9] While these attitudes made future funding of the space program more difficult than in the years between Sputnik I and the mid-1960s, I believe that they are incomplete answers and that to them must be added an

institutional obstinacy at NASA when asked to comply with changing government budgeting methods and changing public expectations about the meaning of the space program by the late 1960s and throughout the 1970s.

The principal reasons for the deceleration of the space program under Nixon and for the rest of the 1970s arose from four rather broad issues that have been largely unexplored in the history of NASA: personnel, budgetary, foreign policy, and political factors. By personnel, I mean that Nixon had no close advisers promoting the space program as he did on the major domestic initiatives he undertook. Put most simply, NASA Administrators Thomas O. Paine, James C. Fletcher, and even Nixon's first two science and technology advisers, Lee A. DuBridge and Edward E. David, Jr., did not have the ear of the president or any of Nixon's inner staff. At the time Nixon also did not perceive the space program in crisis due to lower funding. On other domestic issues this "crisis mentality" on the president's part had proven an essential criterion if additional funding was to be recommended. In particular, I am referring here to the environmental and welfare legislation proposed during Nixon's first administration. While Nixon thought that a crisis existed in funding research and development, he did not think a similar one existed in the space program.[10]

From a strictly budgetary point of view, NASA was a classic example of the myriad cost over-runs present throughout the Federal government in the first half of the 1960s.[11] As an

example, in 1963 Webb announced the establishment of the Electronics Research Center in Boston, one of his most criticized administrative decisions. The subsequent investigation of this and a number of other governmental procurement decisions by Webb continued into the last half of the 1960s, yet one would never know this from the memoranda and subsequent budgets submitted by Administrator Thomas O. Paine who succeeded James E. Webb in September 1968.[12] Neither Paine nor his successor, James C. Fletcher, seemed to grasp the necessity of not only complying with, but actually understanding the new cost accounting methods instituted by the Johnson, Nixon, and Carter administrations. Neither grasped the importance of knowing with whom in the Bureau of the Budget and later the Office of Management and Budget they absolutely had to maintain relations in order to receive serious consideration for their projects during the complicated process that went into determining the yearly expenses of government. As I will detail a little later in this chapter, Paine's behavior during the budget process of 1970-1971, in particular, appeared to Nixon stalwarts at best as irrational and at worst as obstinately arrogant.

My third point in this summary is that the space budget would probably have been reduced in any case in the 1970s because it had originated as a product of the cold war and was therefore subject to rising and falling expectations about favorable relations between the U.S. and USSR. Under Nixon these expectations were high and therefore arguments about "beating"

the Soviets in space carried less weight that they had under Kennedy and Johnson, but NASA administrators and White House science advisers between 1969 and 1972 failed to appreciate this important shift and so they tried to convince Nixon to commit himself to certain aspects of the space program before the Soviet did.[13] In fact, instead of funding more competition with the Soviets, Nixon's geopolitical ideas and his policy of detente emphasized international cooperation and coaptation of the Soviet Union. This included matters involving space.

Finally, the political considerations that worked against increased funding for NASA are self-evident. By 1969 liberals and conservatives in both parties, but especially liberal Democrats, were highly critical of more spending for space when such domestic problems as the environment, poverty, urban renewal, and racism loomed large. Given the fact that until 1988 Nixon remained the only twentieth century president to be elected without his party having control of either house of Congress, he was constantly trying to co-opt liberal opinion on certain issues like welfare to minimize liberal opposition to the war. Likewise, he initially tried to placate conservatives with a "southern strategy" as demonstrated through his first unsuccessful Supreme Court nominees, only to find that they did not fall in line with him on social policy issues.[14] When the chair of the House Committee on Science and Astronautics George P. Miller (D-CA) called the manned Mars mission "premature," and chair of the Senate Aeronautical and Space Sciences Committee,

Clinton P. Anderson (D-NM), did not think "we could afford it now," echoing the skepticism of other "key congressional leaders, Nixon and his close advisers became convinced they would lose little in Congress or the country at large by trimming the NASA budget.[15]

I will now take up each of these four perspectives in more detail to argue that even if the country had been able to finance the cold war in the style to which it had become accustomed under Kennedy and Johnson, and even without the economic dislocation such financing was causing the American economy by 1969, Nixon in all likelihood would not have continued to fund NASA at its peak of the mid-1960s for reasons having to do with his immediate advisers and their relationship with key NASA personnel, reorganization of the executive branch as it affected the budget process, Nixon's "grand design" for foreign policy which included detente with the Soviet Union, and the president's relations with Congress over other domestic and foreign policy issues, in addition to political disagreement among member of Congress over the space program in the post-Apollo era. Moreover, many of these same conditions (with the exception of detente with the USSR) prevailed under the Ford and Carter administrations, insuring that NASA funding throughout the 1970s would not return to the heights it reached trying to beat the Soviets to the moon.

Nixon's Advisers and NASA: A Gap That Was Never Closed

Before describing the specific attitudes about NASA among Nixon's advisers I want to consider the president's own views

about space. Generally speaking, he was probably not a space buff or very knowledgeable about technical details of the Apollo program he had inherited at the moment of its dramatic moon walks. Moreover, Nixon's Memoirs do not reveal any unusual interest in the subject as a member of Congress or later as vice president.[16] It is true that under Eisenhower he had been so impressed with Sputnik that he countered the statements of such presidential aides as Sherman Adams who said the satellite race was no more than an "an outer space basketball game" and advocated increased spending for the missile program and later for human space flight vehicles. In general, however, Nixon seems to have subscribed to the more cautious way Eisenhower approached the militarization of space by connecting it with defense, rather than civilian engineering and prestige.[17]

In fact, Nixon mentioned the space program more during his 1960 campaign for the presidency than he did in 1968. In 1968 he stressed increasing federal and private funds for research and development (R&D) for civilian needs more than space research, and he fulfilled the former as president. By 1972 the Nixon administration had increased R&D funding from $15.6 billion in FY 1969 to $17.8 billion for FY 1973, or an increase of 14 percent.[18] Although he spoke of the Apollo 11 mission as the "most exiting event of the first year of my presidency," Nixon's presidential papers clearly document that his personal interest was more in the diplomacy of space and in the defense and commercial applications of such spinoffs of the space program

such as the anti-ballistic missile (ABM) system and supersonic transportation than in its purely scientific or interplanetary potential.[19] In one of his first meetings with Paine, Nixon kept repeating the phrase "space and defense," leaving little doubt in the administrator's mind that they were inextricably connected in the president's.[20]

As with all issues Nixon did his homework and tried to keep informed, but NASA would probably not even have been on his list of priorities for study had it not been that Johnson intentionally left it for him to formulate national space policy in the post-Apollo period. Again, for someone who has studied other aspects of the Nixon administration, this is not surprising because Johnson also deliberately postponed implementing desegregation of southern schools so that this controversial task would likewise fall on the Nixon watch.[21] Had it not been for Johnson's procrastination, Nixon would not have immediately turned his attention to space policy by establishing a task force during the interregnum period headed by Charles Townes. Its January report to the president-elect essentially reiterated what the 1967 President's Science Advisory Committee (PSAC) had told Johnson. In both reports the "code word" became "balance" which meant a "program based on the expectation of eventual manned planetary exploration, integrating manned and unmanned efforts," with the specific recommendation from the Townes task force, which NASA opposed, that a $4 billion budget would be "adequate for the important programs envisaged." Like the arbitrary figure

that one of Nixon's other task forces set for a new welfare program, this one became imbedded in the thinking of Nixon's White House advisers.[22]

This task force report led Nixon to ask Lee DuBridge, his first presidential science adviser and director of the Office of Science and Technology (OST) to establish a Space Task Group (STG) headed by Vice President Spiro T. Agnew (as chair of the Space Council) to "report on possible cost reductions in specified portions of our space program." In another memo he said that he wanted a "definitive recommendation on the direction which the U.S. space program should take in the post-Apollo period," specifically "a coordinated program and budget proposal," as well as information on "international implications and cooperation."[23] This directive proved a mixed blessing for NASA because Paine almost immediately assumed that Agnew's personal and public support of a "manned flight to Mars by the end of this century" would carry the day inside the White House and Bureau of the Budget when nothing could have been further from the truth. Agnew carried little weight with Nixon or his close advisers and none with the director of the Bureau of the Budget, Robert Mayo, whom the vice president purportedly called a "cheapskate" at one of the STG meetings.[24] Consequently, Paine wasted much time and effort in the summer and fall of 1969 acting as a link between NASA and the STG in the hope of using this report as ammunition against Mayo, instead of preparing the reports requested by the BOB for FY 1971. He apparently never

understood the limited function and impact of most task force reports, and certainly he mistook the lack of favor Agnew enjoyed in the Nixon administration.[25]

Even in the best of times, but particularly in the time of turmoil that existed in the late 1960 and early 1970s, presidential policies seldom reflect exclusively the ideas or personality of any given president. They are, instead, the much more collective product of his aides and various divisions of the executive branch and his own personal administrative mode of operation. I have divided those who advised Nixon on major issues into two camps: the "free-thinking" outsiders who brainstormed with the president about new ideas and comprehensive programs, and the "political-broker" insiders who worked to draft and implement his legislative and administrative priorities.[26] None of these two sets of advisers included any outspoken advocates of the space program and, therefore, none took it upon themselves to present the space program or the NASA budget as a high priority, crisis issue to the president.

These two quite different sets of advisers agreed on one thing: that the president should appoint generalists (policy specialists and politicians) like themselves to oversee the work of civil service specialists (experts or technicians) from the very beginning of his presidency. The reason for this was that generalists would provide him with more moderate and less self- (or agency-) interested advice. Initially, however, Nixon thought that he could appoint generalists both as strong agency

and department heads and as strong White House staff people to monitor them. After the two inevitably clashed in the course of his first administration, he decided to move members of his White House staff (and other generalists who had proven loyalists on policy) from his personal staff into key positions within the executive branch.[27] This did not mean that Nixon was against technology or brought an anti-technology bias to the White House. He and his two sets of advisers simply did not want technocrats to be in the influential policy-making positions they had occupied under Kennedy and Johnson.

John Ehrlichman's papers reveal that although he emerged as the strongest (and one of the most liberal) of Nixon's insider advisers on domestic policy, he had little interest in the space program. (In one interview he implied that Nixon's major interest in Apollo was as a vehicle for uplifting pomp and circumstance for the nation similar to the panoplies surrounding the return of the POW's, national parades, and the short-lived experiment with palace guard uniforms for the White House police force.)[28] This meant that Peter M. Flanigan, an investment banker who had been the deputy campaign manager for Nixon in 1968, was assigned oversight responsibilities for space as part of his general duties as assistant to the president for internal economic affairs. Flanigan in turn relied on Thomas Clay Whitehead, a former RAND systems analyst, to evaluate NASA budget and planning proposals. Although Jerome Wolff, an aide Agnew brought from Maryland to advise him on science and technology,

contacted all these White House advisers about the STG report, Flanigan and Whitehead turned out to be instrumental in making decisions about the NASA budget for FY 1971.[29]

In this environment, there was little push from Nixon insiders for an aggressive space program. Increased funding for NASA would have been an uphill battle in any case, however, since neither DuBridge nor David as science advisors favored human space flight programs and Flanigan and Whitehead were mainly interested in proving to the president that they were at least as committed to cost effectiveness and to producing a balanced budget as Robert Mayo at the Bureau of the Budget. In truth, there was no one in the White House who had much interest in the space program and who wanted to increase its funding levels. As a result, Thomas Paine had no success in February 1969 in convincing Nixon that he should move forward with bold plans for a new objective in space.[30]

When Nixon did not respond to Paine's demands, the administrator threw all of his energy into influencing the STG report and in the process systematically offended both White House aides and top officials at BOB. Whether he felt compelled to act in this manner because, as a Democrat and member of the NAACP, he had actively supported the campaign of Hubert Humphrey, or whether this was his normal operating style remains a question for debate. His resignation in September 1970 came as a welcome relief to both the executive and legislative branches of government. One of the reasons there was a five-month delay in

finding his successor was that his behavior had convinced the Nixon administration that it did not want another Paine as head of NASA. Flanigan, for example, was specifically told to find someone to be NASA administrator "who will turn down NASA's empire-building fervor and turn his attention to 1) sensible straightening away of internal management and 2) working with OMB and White House."[31]

While tempers improved once James Fletcher became NASA administrator in the spring of 1971, the funding situation for NASA did not. This was in part because he relied too heavily on Flanigan for access to Nixon, and by the time of Fletcher's arrival Flanigan had also been appointed executive director of the Council on International Economic Policy (CIEP) and was too busy to be a space advocate inside the White House even he had been so inclined. Because of the situation in the Nixon White House in the early 1970s, without Ehrlichman's active support cuts in the NASA budget could not have been prevented, let alone the increases Paine demanded and Fletcher pleaded for, achieved. In an January 1970 meeting with Paine, the president told him that he regretted the additional cuts in FY 1971, but that Congress and the people were all for severe cuts in "space and defense."[32] By that time Nixon had already begun to withdraw U.S. troops from Vietnam and cut back on defense spending. Whether the public and Congress would have tolerated some increase in spending for space for purely scientific purposes unrelated to defense was never tested by Nixon. For the

president defense and space were one and the same thing as a budget item.

From BOB to OMB and More Headaches for NASA

Closely related to this personnel problem that NASA never solved under Nixon and only marginally so under Presidents Gerald Ford and Jimmy Carter--with whom Fletcher had more cordial and direct access but no more profitable relations in terms of funding for NASA--was the budgetary process itself. In the late 1960s and early 1970s both the Johnson and Nixon administrations introduced new concepts into budget formulation. Nixon's was particularly effective because with Congressional approval it transformed the Bureau of the Budget into the Office of Management and Budget in July 1970. This reorganization was based in part on the advanced corporate theory known as management by objectives (MbO) recommended by the President's Advisory Council on Executive Organization (PACEO), also known as the Ash Council. Nixon did not introduce the MbO component until early 1973, the same year he eliminated the OST, saying that the National Science Foundation was better equipped to carry out the advisory functions of the White House science adviser. Both actions were taken on the recommendation the Ash Council had made as early as the fall of 1969 based on corporate organization theories.[33]

Neither move reflected any anti-technological or anti-science bias on the part of the president or his immediate advisers, including Roy L. Ash who at the time was president of

the high-tech company, Litton Industries. Although Congressional hearings in 1973 and 1974 on Nixon's Reorganization Plan No. 1 were influenced by the emerging Watergate scandal and cannot be taken at face value in discussing the wisdom of eliminating the OST and PSAC, the idea of using the National Science Foundation because it fostered "pluralism" in government funding for science (and hence, better geographical distribution of funds) had its defenders among some scientists, as well business theorists. (Later as head of the Office of Management and Budget Ash would favor funding for certain projects of the NSF over those of NASA.) This reorganization also was completely in keeping with other decentralized programs established in the name of Nixon's New Federalism, but some scientists viewed the demise of OST and PSAC as depriving "the science community of substantial status and influence in the White House," not realizing how little influence either had under the presidents since Kennedy as personal White House advisers came to play increasingly important roles.[34]

Likewise, the adoption of MbO reflected no intrinsic bias against science by the Nixon administration. This recommendation from the Ash Council came on the heels of the failure of the Performance Measures System launched in 1971 as a variation of the Planning Programming Budgeting System (PPBS) originally introduced in 1965 under the Johnson administration. The MbO system was not intended to save money, to decide between competing programs, or even to be a means for the White House to

mandate priorities for individual departments. However, because it insisted on maximizing the best use of government funding based on national priorities, MbO indirectly allowed any president more influence in facilitating the achievement of some of his preconceived objectives.[35]

With or without MbO, the establishment of the Office of Management and Budget remains one of the most influential management changes initiated by Nixon. OMB's review procedures based on central clearance of all department, agency, and commission budgets before they were submitted to Congress was institutionalized by Nixon's successors because of its power to evaluate program performance and to control spending.[36] OMB can be viewed as his most "imperialistic" achievement, because "OMB is on paper the single most powerful managerial unit in the government." It has been so significant that since 1973 only the CIA and the Defense Department have successfully challenged OMB's budget setting powers. In spite of this, by the early 1970s only a few isolated scientists had realized the OMB's potential for "usurping scientific judgment and congressional intent through its impoundments of allocations for scientific research."[37]

There is little evidence, however, in Nixon's presidential papers or in NASA records that either Paine or Fletcher or their aides understood the enormous significance of the basic structural and analytical change that had taken place in budget formulation by the summer of 1970 or the place of OMB in the process. This is especially true of all the interviews with

Fletcher, as well as his correspondence, in which he expressed either dismay or irritation with OMB's procedures but little understanding of how to "play" the game of compliance so as not to hurt NASA requests for budget increases. The same appears true of his attitude toward Congress.[38]

This was even more true of NASA's reaction to Carter's famous, or infamous depending on your point of view, "zero-based budget" (ZBB) plans for OMB. James Fletcher rather pathetically wrote a note saying: "I am not sure what 'zero-based budget' means--but what it used to mean is what I thought we were doing every year. Is this going to give us problems?"[39] It is also not evident that Robert A. Frosch--the oceanographer, flutist, and sculpturer who became Carter's NASA administrator in 1977--was prepared to present NASA budgets any more effectively under OMB management than his predecessors. Not since James Webb in the 1960s had NASA effectively made its case for large budget growth--Webb even received praise from Congress for "his ability to present a very complex budget every year with the enthusiasm of a true believer"--but Webb had operated in a much different budget environment which he understood from his time as Truman's head of the BOB.[40]

Of the three NASA Administrators during the 1970s, Paine behaved more arrogantly than the others, especially when it came to conforming to budgetary process. He ignored BOB's requests for PPBS budget analysis not once, but twice in the spring and fall of 1969. Technically speaking, because sophisticated cost

analysis and budget preparation required computers, NASA should have been able to produce the best in the business. That it could not was evident from the moment that Paine tried to comply with the requests from the STG for its long range plans. Hard as it is to believe now, Webb did not put any formal long range planning structure in place until 1968 even though the House Committee on Science and Technology had called for a report from NASA by the end of 1966 on future national space objectives. According to one authoritative government study, it is quite possible that if Webb had taken this request from Congress seriously, NASA might have fared better later on in the budget making process. Instead, Webb dismissed this request, saying: "Because of the difficult budgetary situation resulting from the war in Vietnam and other factors. . . . we [are] precluded by the regular budgetary procedures from presenting specific statements on our future plans at this time." Thus, spending for Vietnam and domestic social programs began to be used by NASA to rationalize its own inability to present coherent plans or budget for the future of space flight. As late as 1979, members of the House Committee on Science were still complaining about "lack of long-range planning and what seems to be a lack of more specificity in what may be the plans [of NASA] for the future."[41]

Not until 1968 did Webb belatedly put Homer E. Newell, who had run the NASA space science program, in charge of a formal planning structure. Apparently he operated under the illusion that post-Apollo policy would arise out of some kind of public

debate and NASA would simply follow that lead. When this curious way of approaching long-range planning did not materialize and the BOB requested that NASA establish a PPBS system on which to base future budgets, Newell proceeded to set up a cumbersome and unworkable structure, consisting of a Planning Steering Group (PSG) and 12 planning panels representing the complicated competition among manned and unmanned subunits of NASA.[42]

Not surprisingly, NASA's PSG produced mountains of data, but no coherent plan emerged from the process that satisfied Paine in 1969 so that he could respond to the STG request. So Paine turned to George E. Mueller, head of the Office of Manned Space Flight, for help. Mueller produced what was called the "integrated plan," calling for cost effectiveness through developing a reusable spacecraft for operations between the Moon and Earth, once again tieing NASA's future to a huge human space flight project as had been the case during Apollo. Paine liked Mueller's general idea but arbitrarily decided to throw out his "cislunar" emphasis and replace it with human planetary exploration, which would be more inclusive and therefore appeal to more scientists through the pursuing of a larger goal of Solar System exploration. To help focus this plan, Paine highlighted a manned Mars expedition in the report that went to the STG a day before the Apollo 11 launch on July 16, 1969. In spite of the hoopla surrounding the lunar landing, within days Congress and the public were questioning the cost of placing an astronaut on Mars as advocated by the STG.[43]

In the long run, Paine's arbitrary decision to stress a mission to Mars was unsound, especially since Nixon had privately and publicly been stressing international cooperation in space based on a "partner instead of a patron" relationship. The president's greatest worry was that opponents of the space program in Congress would negatively compare "his positive statements on space to problems in poverty and social programs here on earth."[44] While Paine sympathized with this view, he hindered rather than helped the Nixon administration in 1969 and 1970 with his intemperate rhetoric and bullish attitude.[45]

In the process of working on its report, the STG not only contacted members of Congress, but also prominent individual Americans called "invited Contributors."[46] Among them was Shirley Temple Black who sent the vice president a thoughtful nine-page report, stressing international cooperation as the highest priority in space. The vast majority of the members of the STG, the PSAC, and the outside contributors opposed Paine's idea of a hastily organized Mars expedition based on current technological capabilities. Most importantly, STG member Robert C. Seamans, Secretary of the Air Force, joined by budget director Mayo, strongly opposed a manned planetary mission.[47] By the end of July both NASA and the PSAC presented reports to the STG. Criticism in Congress and by the American public led the STG to recommend the concurrent or sequential building of a space station and shuttle and to speak only of an "eventual, potential option of manned mission to Mars before the year 2000." In

keeping with advice from White House advisers the report stressed the low rather than high cost options that would not cause the president political damage if he rejected any of them. Therefore, the STG did not recommend any one of the three specific program options to the president and there were no figures in the report analyzing the various costs of the alternatives.[48] In essence, the STG report represented much ado about nothing, except that Paine mistakingly chose to make it the focus of his activities throughout much of 1969.

Because of the inefficient budget process and Paine's obsession with satisfying requests from the Space Task Group rather than those from BOB, he could not comply with two BOB deadlines for NASA FY 1971 submissions in the spring and fall of 1969. It also did not help matters when Mayo criticized the "shortcomings" of the STG report, since it did not recommend any one program to the president. To most observers in the White House and BOB the NASA budget process was in a state of "disarray," not simply because of Paine's insisting on responding to the STG rather than to the BOB, but also because of the inability of NASA to put together the type of budget being requested by the budget director and his staff.[49]

After declaring that the inevitable BOB cuts were "unacceptable," Paine appealed the decision and then presented a budget in November 1969 of $4.25 billion (down from an earlier $4.497 billion NASA request) that he said was the lowest the space agency could tolerate with the response from the BOB that

NASA's budget could be no more than $3.7 billion (up from an original mark of $3.349 billion). Obviously an impasse had been reached and at this point the White House staff intervened, but not on the side of NASA because only Vice President Agnew, whose advice was ignored, supported a higher budget. As a result, NASA not only had to accept a cut in FY 1970 prepared by the Johnson administration after the Nixon administration reviewed it, but also in the BOB figure for FY 1971 after the White House staff, consisting of Flanigan and Whitehead, had reviewed that one and recommended $3.53 billion. Even as Paine was announcing this figure to the press, the White House decided on another 2.5 percent across the board cut for all agencies in order to present a balanced budget to Congress. So without consultation with NASA, the agency's budget was reduced to $3.3 billion.[50]

What these figures and subsequent ones throughout the Nixon and Ford administrations meant was that there would be no development of a space station or space shuttle during FY 1971, a reduction of Apollo missions from three to one a year, the termination of the Saturn V booster, and no new unmanned projects because science and application programs would be held to existing levels.[51] In this fashion the budget begat space policy instead of space policy begatting budget as had been the case during the heyday of Apollo in the Kennedy and Johnson administrations.

Early in the 1976 presidential campaign Carter tried to distance himself from Nixon's and Ford's "balanced" approach to

manned and unmanned space projects, saying his administration would reject "costly missions . . . in favor of unmanned scientific exploration and practical applications of existing technology."[52] In particular, Carter thought that it was "neither feasible nor necessary at this time to commit the U.S. to a high-challenge space engineering initiative comparable to Apollo." As president, Carter returned U.S. space policy closer to what it had been under Eisenhower "which saw the development of space technology only as a means, not as an end in itself." Specifically Carter said (somewhat redundantly) that "activities will be pursued in space when it appears that national objectives can most efficiently be met through space activities." He also decided to retain the same link between "military and space" that Nixon brought to the office of the presidency. And, of course, so did Reagan with his "strategic defense initiative" program.[53]

This acrimonious relationship between NASA, the White House, and BOB preceded both Fletcher's becoming NASA administrator in 1971 and Nixon's decision to endorse the reusable Space Shuttle program in 1972. By that time, however, Mayo and the BOB were no longer around to plague NASA; instead there was the new Office of Management and Budget under the direction of Roy L. Ash, whose earlier reorganizational plans as head of PACEO had contained implicit criticisms of NASA's management approach. Paine had gone out of office after adopting the most excessive aspects of Vice President Agnew's argot by taking potshots at "Potland" (a reference to those in the counterculture whom Paine insisted were

enemies of technology). This did not endear him to Nixon stalwarts. Neither did his antics in a 1970 commencement address at Worcester Polytechnic Institute when Paine proposed a hypothetical cabinet made of up of Timothy Leary as secretary of agriculture; Jane Fonda as secretary of interior; Arlo Guthrie as secretary of HEW; Ralph Nader as secretary of commerce; and Bobby Seale as Attorney General. He also took shots at congressional critics of the space program, such as Senator Edward M. Kennedy (D-MA), accusing him of poor taste in cuisine because of the quality of a lunch he had with him. Without question, Paine bequeathed to Fletcher a bewildering public relations problem with his trail of mixed and ill-considered messages, leading one commentator to say that he "appear[ed] a little fey." Paine also left office under the cloud of mishandling a $50 million contract with GE-Hiller Fairchild. With all of these concerns, there was little sentiment in the Nixon administration for Paine to stay at NASA.[54]

After all that had gone before James Fletcher was ridiculed in 1971 when he took over NASA's reigns--one reporter even describing him misleadingly as a "Mormon for the Moon"--and he had to work hard to return to a more productive relationship with the White House by adopting a mild-manner demeanor in dealings with the Nixon, Ford, and Carter administrations. It was inaccurately assumed by the press that Fletcher would not stay long in the job because he only took two-year leave of absence as president of the University of Utah. He stayed at NASA from 1971

until 1977--almost as long as Webb--and he became quite successful in working quietly to achieve the ends of the agency as he interpreted them. At the same time, Fletcher exhibited some of the same grudging attitude in dealing with OMB and Congress that Paine had displayed in a more overt fashion. He once said that the one thing he had learned as NASA administrator was that a "deal from OMB is no deal at all," in reference to a perception that NASA had suffered budget cuts below the level agreed to by the agency and the White House. He also criticized Congress for having too few "prospace" members on the appropriations committee.[55]

Fletcher immediately had to deal with Nixon's March 7, 1970, statement about space that specifically encouraged "greater international cooperation" in keeping with his September 1969 address to the United Nations where Nixon called for the "internationalization of man's epic venture into space."[56] Because this was such a vague mandate, Nixon's White House advisers, OMB, and NASA all tried to convince the president that their specific recommendations should be selected to fill in the gaps. In this process two of Nixon's political broker insider advisers at OMB--Casper W. Weinberger, OMB deputy director, and Donald B. Rice, an OMB assistant in charge of NASA budget initiatives--provided Nixon with most of his information before his 1972 decision in favor of the reusable Space Shuttle. Within the White House, Flanigan and Ehrlichman also occasionally contributed to the discussion.[57]

Rice carried on Mayo's budget slashing ways under his new boss, Roy Ash, at the newly created Office of Management and Budget. In particular, Rice did not think that NASA was capable of qualitatively evaluating its own programs and priorities. No other federal agency on the domestic side of policy making except the Atomic Energy Commission, according to Rice, was so unreflective. NASA always appeared to be trying to place the president in an either/or situation. As Rice put it, the president "could either proceed with [NASA's] program . . . or he could take the U.S. out of manned space." Rice kept pressing NASA to produce the best shuttle for the least money. Fletcher tried to convince him of NASA's ability to conduct a space program that included a reusable Space Shuttle. He eventually did so, compromising NASA's plans for full-reusability in the process, but not before much before more ill-will had been generated between NASA and OMB during 1970 and 1971.[58]

Had it not been Weinberger's presence, and to a lesser degree that of Robert C. Seamans and David Packard at the Department of Defense and a few individuals involved in foreign policy issues such as Henry Kissinger--all of whom also supported the reusable shuttle idea, but for quite different reasons--the space shuttle decision might not have been reached in 1972. It is to Fletcher's credit that he realized this and incorporated and kept key leaders in the Nixon administration in his shuttle coalition. Among other selling points he emphasized military applications and the international cooperation inherent in the

shuttle program, and several of these leaders--including Nixon--were impressed by both arguments.[59]

Weinberger opposed recommendations from the OMB staffers who did not want to fund the shuttle program and in a crucial memorandum to Nixon in August 1971, the OMB deputy director argued that the administration should not give the impression to the world that its best years in space were behind it and so he recommended funding the last two Apollo flights, the Skylab orbital workshop, and the space shuttle. Weinberger's access to Nixon through his second boss at OMB, George Schultz, may have "saved" NASA from declining even further as a budgetary priority because Nixon replied in a handwritten comment: "I agree with Cap."[60] OMB staffers and NASA personnel were not immediately informed of this exchange and they continued to haggle over funding for space, including the Space Shuttle. At one point White House Science Advisor Ed David informed Fletcher that there were no staffers "in OMB who could be completely trusted--not that they were dishonest, but that their sole function was to put a ratchet on the budget and couldn't make a commitment to hold the line on anything."[61]

An important factor aiding NASA in gaining approval of the Space Shuttle at this time was the fact that 1972 was, after all, an election year. John Ehrlichman pointed out to Nixon that some "close" states controlling large number of electoral votes were also those with space industries which would benefit from a the new shuttle program. Toward the end of the process in December

1971, Fletcher and George Low, NASA deputy administrator, met with Flanigan and science adviser David. At that time they were told that the president had all but decided to go ahead with the shuttle program. It was at that point that Fletcher and Low flew to California to meet with Nixon when he announced his decision on January 5, 1972.[62] The decision-making process had clearly been driven by advisers who knew Nixon best, not NASA personnel.

In retrospect it is clear that Nixon had no choice but to opt for some kind of major human space flight project to succeed Apollo; the astronauts provided the necessary human element of a science that was largely unintelligible to the average person. No president in the 1970s wanted to be responsible for "killing" the only compassionate symbol of space exploration: the astronaut in orbit. Nixon, Ford, and Carter proved no exceptions to this rule, so the U.S. manned space program continued but at a decelerated pace, except in the area of space diplomacy.

The Diplomacy of Space Under Nixon: Cooperation not Competition

During the summer of 1969 as U.S. foreign policy was being formulated largely in secret (including the bombing of Cambodia), congressional opposition loomed large in the president's mind. The ways in which he and his aides tried to outmaneuver diplomatic initiatives on the part of the U.S. Senate forced Nixon into a delicate political balancing act that ultimately shaped his and Henry Kissinger's "grand design" more than they wanted at the time and more than they have admitted since. Their "grand design" thus became more of a "balancing act" than a

blueprint for U.S. diplomacy; and, much like the detente that became its center piece, it remained a process rather than a fixed policy.[63]

In reality, detente from a "Nixinger" perspective represented nothing more or less than a political and economic means or strategy or process (as opposed to an actual goal or condition) for: 1) avoiding nuclear war; 2) "building a network of mutually advantageous relationships"; and 3) a way of modifying Soviet behavior by gaining its de facto acceptance of international cooperation and competition (sometime referred to as "competitive coexistence") in order to preserve international stability by according the Soviet Union a greater stake in the status quo. In other words, it was an attempt to coopt the USSR. To a lesser degree than some have argued, detente also reflected the domestic and international economic problems the United States faced as a result of the impact of the Vietnamese war, which meant among other things that it could not continue to fund the race for space with the Soviets as it had previously.[64] An aspect of detente not explained to the American people was that for Nixon space always meant defense first, and he associated it with ICBMs, reconnaissance satellites, and especially an important personal agenda item, the ABM program.

The U.S. space program entered this equation in a very unusual way soon after Nixon entered the White House. He viewed any opposition from Congress to the proposed ABM system as not only a threat to the possibility of detente, but also to

continued U.S. conventional arms support for the North Atlantic Treaty nations because liberal, Democratic Senators who opposed ABM tended to be the same Senators who wanted to reduce U.S. troop strength for NATO. Nixon was forced to deal publicly with ABM and NATO issues surrounding disarmament, even though arms reduction had not originally been part of his "grand design."[65] Many of the same Senators also opposed any expansion of the space program and this complicated Nixon's problem in dealing with them because, like the president, they associated the ABM with the space program, but unlike him, they did not want to fund either an aggressive civilian or military program. Nixon's only public concession on the issue was to downgrade the "extensive ABM coverage" known as Sentinel under the Johnson administration to a "reduced version" he called Safeguard--another major policy decision about which NASA was not consulted. OST, PSAC, and NASA were simply out of the loop when it came to major foreign policy decisions that affected the space program.

During the spring and summer of 1969 Nixon dealt publicly and privately with NATO nations and constructed his gradually emerging detente policy--all the while battling U.S. Senators over the ABM--but conceding to their frugal perspectives on the space program. The president's handwritten comments and memoranda testify to his personal involvement in the domestic political fight over the ABM issue, but they do not indicate that he became personally involved in the House and Senate battles over the funding of other space efforts. The president persuaded

most of the American public to accept his ABM proposals, and at the same time to question more spending for space. Nixon privately called Senator Edmund Muskie's proposal to use the $6.6 billion proposed for the ABM on hunger and poverty at home and abroad, "unbelievable nonsense from a national leader!" When he read that former astronaut and then Ohio Senator John Glenn had called the ABM a "false hope" because "no one knows if its works," the president sarcastically asked: "did he know the first space shot would absolutely work?" Obviously Glenn's criticisms did not encourage the president to accept NASA's requests for increased funding while the ABM debate raged during the spring and summer of 1969.[66]

In this political battle over the ABM system, Nixon and his staff never reconciled the potential contradictions inherent in it; namely, competition with the Soviet Union over the two countries' respective ABM systems and international cooperation with the Soviets in space. Their views and actions clearly convey that the space program was but one of many complicated issues the new administration dealt with in its first months in office and that it took a back seat to most of them. Fletcher's memoranda indicated that despite the fact that Kissinger, along with his aides Al Haig and Jack Walsh, supported the continuation of some kind of human space flight, there was a "lack of advocacy in the Executive Office," except in the general area of international cooperation, because "they have been so busy" with other policy areas.[67] Fletcher and Low, like Paine and Low

previously, placed too much confidence in presidential advisors who did not deliver under either Nixon or Ford.

Given these basic principles of Nixon's foreign policy, it should come as no surprise that from the moment he became president he and National Security Adviser Henry Kissinger urged NASA to pursue international cooperative opportunities, which both the agency, and some of its corporate clients, and some Congressmen often found difficult to accept for ideological and commercial reasons.[68] Nonetheless, internal White House memoranda in the early 1970s made it clear that NASA was following rather than leading the way toward international space cooperation. A segment of one such memorandum read: "NASA has been proceeding in this area with the understanding that it is responding to the President's policy," while another described Paine as "alluding repeatedly to what he described as [the president's] views" when encouraging "international cooperation in space."[69]

Less than two weeks after he was inaugurated, Nixon requested a "summary of European space activities . . . appropriate . . . to discuss with the Europeans." Paine sent him a six-page confidential response, emphasizing "additional ways in which you might express your personal interest in space cooperation." Paine indicated to the president that the half-dozen European nations developing their own space programs all feared that the United States would "impose its will on the direction of future West European space activities." Paine also

kept Nixon informed about the results of his trips abroad on behalf of space cooperation. The administration considered the issue of cooperation on space by western nations in the post Apollo era so important that the National Security Council produced a National Security Decision Memorandum No. 72 creating an Ad Hoc Interagency Group headed by Arnold W. Frutkin to coordinate space cooperation.[70] In retrospect, the most important cooperative action in space completed during Nixon's administration was the International Telecommunications Satellite Organization (INTELSAT), which went into operation in December 1972. Although a global communications consortium had been formed in 1964 after the launching of the first Telestar satellites, ratification by 54 of the 83 Intelsat nation members took eight years of complicated negotiations, the most energetic of which came during the first term Nixon occupied the White House.[71] However, the center piece of Nixon's space diplomacy, which emphasized international cooperation, became the much publicized Apollo-Soyuz mission which both Paine and Fletcher pursued at the insistence of the president.

There was no substantive response from the Soviets about cooperating with the United States on space until the end of the 1969 and even then it was clear that the USSR was at only interested in coordinating planetary "goals" and in exchanging "results of unmanned planetary investigations." An interim step in this process resulted in the January 1971 NASA/Soviet Academy of Sciences agreement on space science and applications, but at

that the time Soviet policy still prevented "discussing future mission plans and experiments in advance." Finally, the Apollo-Soyuz Test Project (ASTP) became a reality in the summer of 1972 following Nixon's successful May summit meeting in Moscow, which included four cooperative agreements with Moscow on space, medicine, science, and technology. Although some secondary sources attribute this achievement to the efforts of either George M. Low, acting NASA administrator following Paine's resignation, or to his successor, James Fletcher, it is unlikely that the necessary equipment for international rescue and the crew exchanges could have successfully taken place in 1975 if it had not been an important ingredient in Nixon's policy of detente with the Soviet Union.[72]

The Politics of Space in Congress: Disagreements and Investigations

Presidents Nixon, Ford, and Carter generally did not have to fight Congress over the space program because members of both houses fought each other over it at two levels. Sometimes, when they were not disagreeing over the merits of manned versus unmanned space projects and competing their costs with domestic social programs, they were competing with one another to obtain space contracts for their respective states. The only notable bipartisan consensus that emerged in the 1970s occurred in opposition to Nixon's decision to abolish the Office of Science and Technology in 1973. This consensus was strengthened as Watergate related events began to overtake the Nixon

administration and when Vice President Ford implied he would support legislation to reinstate a science adviser in the White House. As president, Ford signed the 1976 legislation establishing the Office of Science and Technology Policy (OSTP), but then angered some senators by appointing H. Guyford Stever, former head of the National Science Foundation, who had been accused in 1975 of mismanaging public funds in a NSF-funded project called "Man: A Course of Study" or MACOS. While President Carter appointed Frank Press as his OSTP director in 1977, the new president did not agree with the congressional interpretation of the 1976 act and finally overrode a portion of it in 1978 by issuing an executive order that transferred responsibility for preparing science policy reports back the National Science Foundation. By 1979 most of these differences over procedure between Carter and Congress had been ironed out and the administration gave strong support to completing shuttle development. Thus, the decade ended on a note of cooperation between Congress and the White House.[73]

Of the three men who served as NASA administrators in the 1970s, Fletcher was more careful than either Webb or Paine in handling NASA contracts with the space industry because these had been the source of bitter political controversy in Congress since the 1960s as individual congressmen fought each other over the awarding of lucrative space contracts through the promotion of certain sections of the country over others. Such charges first became public in 1964 when it was discovered that NASA personnel

at certain facilities were assisting contractors and universities in their regions to obtain procurement contracts. The most publicized investigation took place after the tragic fire in January 1967 which killed three Apollo astronauts. At one point during the investigation Representative Olin E. ["Tiger"] Teague (D-TX), normally one of the strongest congressional supporters of the space program, issued a broad indictment of NASA's exercise of quality control over North American Aviation, the Apollo capsule contractor. Although Webb left office highly praised by individual members of Congress, he left behind a history of contract problems that his successors could only ignore at their peril. As noted above, Paine resigned with similar charges of favoritism hanging over his head.[74]

Fletcher found, however, that he had a unique problem with regard to awarding procurement contracts. From his earliest days as administrator, Fletcher was under pressure to put space money in Utah, his home state. When faced with unusually strong pressure he finally had to write to Senator Frank E. Moss (D-UT), chair of the Senate Committee on Aeronautical and Space Sciences, the following letter in February 1973:

> I feel an obligation to respond to the numerous efforts made by your office of late to have this Agency, and, in particular myself, look with considerable favor at the placing of some of our business in your State. Not only would it be highly irregular to say the least, but might provoke the kinds of inquiries we are not prepared at this

time to handle. . . .

Bear in mind that I also have roots there too . . . and while I may not have a particular constituency to serve as you might, yet there are particular individuals whom I hold in high regard and have tried to help from time to time when it was within my power to do so.

One of these, as you may well know, is President Tanner. He has exhibited considerable energy and determination in revitalizing some of your downtown area in Salt Lake City. . . . We've explored together various options at great length as to how this might best be achieved with a minimal amount of attention being drawn to either of us.

But the fact remains, Mr. Chairman, that my hands are tied for the time being. In my present position here at this particular Agency, it would be extremely difficult if not somewhat unethical for me to channel any more of our contracts towards your State without arousing further suspicion. . . .

I should also like to call your attention to another matter along these same lines. One of your staff -- I think you probably know who I am referring to -- went so far as to insinuate sometime ago that I had a moral, if not a spiritual obligation to acquiesce on some of [sic] business issues previously raised by President Tanner. This person voiced an unthinkable opinion to the effect that my Church

membership took precedent over my Government responsibilities. Knowing that you share similar sentiments with me in the clear separation of Church and State, I would like to request that you take this unpleasant matter under advisement with the individual in question and explain just how serious and unconscionable those inferences were. In the meantime, I will see what else can be done for you.

But right now I must pursue a course that, at least, seems to be equitable to all parties concerned. Sometimes substantive actions don't count as much as how other perceive them to be. Who would know better about this, Mr. Chairman, than someone in your position. I'll be in touch.[75]

Clearly the life of any NASA administrator was not an easy one when it came to avoiding favoritism or conflict of interest in approving NASA contracts. After a long drawn out process, in 1975 the Utah-based Thiokol Chemical Company did obtain a $1.59 billion Space Shuttle solid rocket motor contract, but only after such competing companies as Lockheed, United Technology Center, and Aerojet, members of the House and Senate, and governors representing them to NASA unsuccessfully appealed the decision to the General Accounting Office (GAO).[76] The fact that NASA's procurement decisions were upheld in the face of contractor appeals did not alleviate the political controversy they caused in Congress at the time.

Aside from geographical and partisan disagreements over the

awarding of NASA procurement contracts, Congress disagreed most during the Nixon administration over his decision to fund the Space Shuttle program and the president's insistence on the Apollo-Soyuz mission as part of detente with the Soviet Union, in spite of the fact that Nixon held both up as cooperative projects that could save NASA money. The debates in 1972 over the shuttle probably represent the most partisan ones of the decade because of the pending presidential election. On the other hand, the Apollo-Soyuz produced in the early 1970s another kind of partisan debate because some of the strongest congressional defenders of the space program, such as Teague, were also adamant cold warriors who did not want to cooperate on anything with the Soviet Union.[77] That these two sets of congressional debates in the 1970s took place under the Republican administration of Richard Nixon should not come as a surprise because both houses of the Congress were controlled by Democrats.

The shuttle had to compete with Democrats (some of them potential presidential candidates) who wanted to fund domestic spending programs rather than any of Nixon's foreign policy endeavors and they perceived space almost entirely as part of his geopolitical designs (even though the administration considered space a domestic budgetary issue). Consequently, Senators William Fulbright (D-AR), Edmund S. Muskie (D-ME), George S. McGovern (D-SD), Thomas F. Eagleton (D-MO), William Proxmire (D-WI), Jacob K. Javits (R-NY), and Walter F. Mondale (D-MN) all came out against funding for the shuttle program as did such

members of the House as Bella Abzug (D-NY) and Les Aspin (D-WI). It should be noted, however, that Senators Hubert Humphrey (D-MN) and Henry M. Jackson (D-WA) supported the Space Shuttle program. While congressional opponents of the Apollo-Soyuz mission were not quite as prominent, with the possible exception of Teague, they were no less formidable.

Of all the partisan opponents of the shuttle program, Mondale pursued the issue with the most single-minded vigor. "Virtually all of the useful things we have gotten out of space; communications, earth surveillance, weather stations, navigation, the technology of instrumentation and miniaturization," he said on the television program, "Issues and Answers," in January 1972 "most of this has come about through unmanned instrumented [sic] flight." Mondale also introduced on the floor of the Senate a bill that would have killed funding for the shuttle program in FY 1973, but it was defeated on the floor by 21 to 61 on May 11, 1972. As the Democratic presidential candidate McGovern went so far as to say that the shuttle was "Nixon's boondoggle," and an "enormous waste of money," while his first running mate, Thomas Eagleton, said that it would "deprive important social programs of much-needed revenue." Eagleton's argument was echoed by almost all the Democratic (and some Republican) opponents of funding for the shuttle.[78]

In addition to the two major partisan debates that took place in the first half of the 1970s noted above, there were three other important attacks on space funding in 1974, 1975, and

1977, led by Representative Edward P. Boland (D-MA), chair of the House appropriations subcommittee in charge of NASA and NSF programs. In the first instance, Boland successfully opposed the "development of a large space telescope and deferred development of an experimental satellite to observe ocean characteristics (SEASAT)." Some funding for the later was restored by the Senate. Then in 1975, Boland successfully delayed for one year the "active development" of the Pioneer satellite to explore the planet Venus, but again the Senate restored the funding for this mission. Finally, in 1977 Boland succeeded in getting the House to vote against funding the develop the Galileo probe to Jupiter.[79] All in all, however, Boland's efforts proved delaying tactics rather than permanent cancellations in the 1970s. By the end of the decade, he was still holding the line on NASA appropriations. However, he began working more cooperatively with Representative Don Fuqua (D-FL) when he succeeded Teague as head of the House Committee on Science and Technology.[80]

In summary, neither the three NASA administrators nor the three men occupying the White House in the 1970s experienced total defeat in Congress on any given space idea (with the exception of Paine's efforts to gain approval for a manned mission to Mars, although that never came to a vote in either house). Nonetheless, even Carter, the one Democrat of the presidential trio, and his NASA administrator, Robert A. Frosch, the second Democrat to serve at the space agency in the 1970s, faced problems on the Hill with their space projects from time to

time. Congress played a prominent role in the deceleration of the space program despite the entrenched power of several committees in both houses which traditionally favored strong funding for NASA. In retrospect, the most drastic decreases in NASA budgets, between what various administrations requested for NASA and what Congress appropriated, occurred in FY 1959 (-20.6 percent), FY 1964 (-10.7 percent), and FY 1968 (-10 percent). These cuts before 1970 were proportionately much larger than any that occurred in the following decade when the discrepancies between White House requests and congressional appropriations showed a positive rather than negative relationship, meaning that Congress usually appropriated more than the administration requested. Nonetheless, NASA's budget continued to decline from FY 1967 through FY 1974 with the most precipitous declines taking place under Johnson, leveling off under Nixon, and beginning to rise slightly under Ford and much more steeply under Carter until in FY 1980 it reached $5.24 billion, almost equal to the previous peek appropriation in FY 1965 of $5.25 billion. During the same period NASA staffing fell from a high of 34,000 in 1965 to 23,000 in 1980.[81]

Conclusion

A combination of political disputes in Congress, sometimes stimulated by White House policies and sometime not, along with new and more demanding budgeting procedures, and the increased importance of White House personnel at the expense of science advisers or NASA administrators, combined to reduce funding for

space in the decade of the 1970s. Without either a strong popular constituency to overcome these factors or effective leadership on the part of NASA to mobilize popular or congressional support as a counterbalance to the agency's decreasing importance inside the White House, or both, deceleration was inevitable. It did not, however, take place exclusively in the 1970s, nor did Nixon initiate it, as is usually assumed.

Curiously, in 1975 Art Buchwald, a cartoonist not known for his knowledge of space, touched on an important part of the problem in a conversation with James Fletcher. In discussing why NASA manned flights and non-space program applications had not been given more attention in the press since 1969, Buchwald unhesitatingly said it was because they were not controversial enough. "Webb was a very 'abrasive' guy [who] was always stirring up controversy," Buchwald told Fletcher. He recommended that the administrator "stir things up a bit." Fletcher, who was to head NASA for most of the decade sadly agreed, but said that he could not follow such advice: "I believe I understand . . . [what is meant] by gray leadership at the top. [But] I am not about to change--I think a degree of professionalism is called for right now, not controversy. Unfortunately however, it probably is true, that as a result we're going to have some difficulty attracting public attention." In 1977 when the Wall Street Journal declared that Fletcher "had no flair for politics or publicity," Barry Goldwater (R-AZ) defended him by saying that

"we have enough people heading agencies in this town with a flair for circus-style showmanship. It is a pleasure to have a man like Jim Fletcher who knows where he is going and what he is supposed to do and does it."[82]

Indeed, in the decade following the moon landings, NASA seemed to have greater talent for attracting either the wrong kind of attention, especially early on, or no attention at all, especially later in the 1970s. As a result, its budget, programs, and prestige suffered and space policy took a back seat to a myriad of other concerns by those sitting in the White House. NASA's programs were not simply the failure of presidential leadership--the so-called myth of the imperial presidency--or of NASA and congressional leadership, but were related to larger questions facing the American nation in the 1970s. To a very real extent the space agency was throughout the decade of the 1970s out of sync with political, cultural, and socioeconomic trends in the United States, and it is unlikely that affirmative leadership at any level could have overcome all of those. Rather the broad themes of personnel, budgeting processes, foreign policy, and political factors all combined with the leadership issue to bring about the deceleration of NASA in the period.

Notes

1. Both terms are used in John M. Logsdon, "The Space Program during the 1970s An Analysis of Policymaking, " unpublished paper, 1974, pp. 4, 11, NASA Historical Reference Collection, NASA Headquarters, Washington, D.C.

2. For details about how Kennedy reversed Eisenhower's policies on space, especially in the area of policy and prestige, see John M. Logsdon, The Decision to go to the Moon (Cambridge, MA: The MIT Press, 1970). For a fine discussion of Eisenhower's measured response to Sputnik see Robert A. Divine, The Sputnik Challenge (New York: Oxford University Press, 1993).

3. It is often forgotten that in his farewell address to the nation, Eisenhower not only warned against a "military-industrial complex," but also a "scientific-technological elite." Beginning with Eisenhower, however, no president until Reagan clearly indicated to the American people that militarization of the space program was inevitable given the need for satellite systems by ICBMs and later by anti-satellite systems and laser and particle beam weaponry. Instead, both the Vanguard satellite program and later the Apollo one were sold as "civilian" enterprises which initially only military experts knew to be untrue because of the ready application of technology to military purposes. In contrast, DeGaulle openly touted the military aspects of the French space program, while in the U.S. passive militarization of

space has taken place for years. See James Killian, Sputnik, Scientists, and Eisenhower: A Memoirs of the First Special Assistant to the President for Science and Technology (Cambridge, MA: Harvard University Press, 1977); Colonel Petkovsek, "L'utilisation militaire des engins spatiaux," Revue Militaire Generale (July 1961); Alain Dupas, Las lutte pour l'espace (Paris, 1977); Paul B. Stares, The Militarization of Space: U.S. Policy, 1945-1984 (Ithaca, NY: Cornell University Press, 1985).

4. Apparently Johnson borrowed this metaphor from his press secretary George Reedy, but the Soviets also used it. See: Herbert L. Sawyer, "The Soviet Space Controversy, 1961-1963," Ph.D. dissertation, Fletcher School of Law and Diplomacy, 1969.

5. "Man on the Moon: The Epic Journey of Apollo 11," CBS News interview of Johnson by Walter Cronkite, July 21, 1969.

6. For one view of the decade, see Allen J. Matusow, The Unraveling of America: A History of Liberalism in the 1960s (New York: Harper & Row, 1984).

7. Gallup poll, August 6, 1969. This poll reported that when asked if money should be set aside for a manned Mars landing, 53 percent of Americans said they opposed, while 39 percent said they favored this idea. A subsequent Harris Survey confirmed this when 47 percent said "no" to spending $4 billion dollars a year for 10 years to "explore the moon and other planets in outer

space," while 44 percent said "yes." Cited in Congressional Quarterly, February 13, 1970, p. 403; and Louis Harris, The Harris Survey Yearbook of Public Opinion, 1970 (New York: Louis Harris and Associates, 1971), pp. 83-84.

8. While Harris polls from 1966 though 1973 showed that public confidence in science dropped by 19 percent, confidence in most U.S. institutions, such as education, the military, and business, also fell in that same period. In fact, the counterculture group which drew largely from middle- and upper-middle class students was not as distrustful of science as lower-class, less educated Americans. See Amitai Etzioni and Clyde Nunn, "The Public Appreciation of Science in Contemporary America," Daedalus, 103 (Summer 1974): 191-205.

9. James C. Fletcher, "Antitechnology Bias," Air Force Magazine (Sept. 1971): 53; Sylvia Doughty Fries, "Expertise Against Politics: Technology as Ideology on Capitol Hill, 1966-1972," Science, Technology, & Human Values 8 (Spring 1983): 6-15; and idem, "The Ideology of Science during the Nixon Years: 1970-76," Social Studies of Science 14 (1983), 326-328, 337-338. Also see: Interviews with Fletcher, 27 December 1972 by Robert Sherrod, September 21, 1977 by John M. Logsdon, and by Roger D. Launius, September 19, 1991, NASA Historical Research Collection. All these interviews confirm Fletcher's belief that a strong antitechnology bias existed in the country by the early 1970s.

10. Richard M. Nixon, "The Research Gap: Crisis in American Science and Technology," October 5, 1968, cited in Edward David to Ed Harper, February 3, 1972 (with attachments quoting Nixon's campaign statements about R&D for civilian needs and space), Box 26, Papers and other Historical Materials of Edward E[mil] David, Jr., Office of Science and Technology [OST] Files, Staff Member and Office Files [SMOF], White House Central Files [WHCF], Nixon Presidential Materials [NPM], National Archives and Records Administration [NARA], Alexandria, VA [hereafter cited as David Papers, OST, SMOF, WHCF, NPM, NARA]; and Joan Hoff, Nixon Without Watergate: A Presidency Reconsidered (New York: Basic Books, forthcoming 1994), pp. 409-17, 600-24 (page references are to typescript).

11. The first cost over-runs became severe in 1962 and critical by 1963 as the original budget of $350 million for the Gemini program reached $1 billion. See: Roger E. Bilstein, Orders of Magnitude: A History of the NACA and NASA, 1915-1990 (Washington, DC: NASA SP-4406), p. 69; Ken Hechler, Toward the Endless Frontier: History of the [House] Committee on Science and Technology, 1959-79 (Washington D.C.: Government Printing Office, 1980), p. 101, passim.

12. Webb had apparently made a deal with President Kennedy to locate the Electronics Research Center "in walking distance of both Harvard and MIT." The decision on the location of the

Electronics Research Center apparently was made by three senior NASA administrators: Robert C. Seamans, Jr., Hugh L. Dryden, and Webb. Although the facility became operational in 1965 and had 844 employees by 1969, the project was canceled on 29 December 1969 by the Nixon administration, according to statement by Thomas O. Paine, on the grounds that "NASA cannot afford to continue to invest broadly in electronics research as we have in the past." NASA then transferred a physical plant representing a $30 million investment and equipment worth $20 million to the Department of Transportation where it was renamed the Transportation Systems Center. The same pattern of controversial funding that was ultimately withdrawn after much time and expense occurred with the Nuclear Engine for Rocket Vehicle Applications (NERVA) and System for Nuclear Auxiliary Power (SNAP). See Hechler, Toward the Endless Frontier, pp. 219-31 (quotations at pp. 229-30), 255-57.

13. Edward E. David, Jr., to Peter M. Flanigan, Box 35, David Papers, OST; George M. Low to Peter M. Flanigan, December 12, 1970, Flanigan Files, SMOF, WHCF, NPM, NARA.

14. Hoff, Nixon Without Watergate, pp. 409-17, 449, 500-505, 616-20, 929-34, 952-53.

15. Aviation Week and Space Technology, August 18, 1969, p. 16; New York Times, July 18, 1969; and Washington Post, August 12,

1969; Congressional Quarterly: On the Issues, February 26, 1972, p. 435.

16. Richard M. Nixon, The Memoirs of Richard Nixon (New York: Grossett and Dunlap, 1978), there are only 7 page references to the space program in this thousand page memoir.

17. Ibid., pp. 428-30.

18. Paine memorandum for the record about January 22, 1970, meeting with Nixon, Flanigan, and Ehrlichman, White House President, Nixon, Correspondence with NASA, 1968-1972, NASA Historical Reference Collection; Edward E. David to Ed Harper, February 3, 1972 (with attachments quoting Nixon's campaign statements about R&D for civilian needs and space), Box 26, David Papers, OST, SMOF, WHCF, NPM, NARA.

19. Nixon, Memoirs, p. 428. In 1989 Scott E. Lewis prepared a detailed finding aid on all space resources in the Nixon Presidential Materials (NPM) at the National Archives and Records Administration (NARA) in Alexandria, Virginia. More than anything, it reveals how little interest there was in NASA and space compared to other domestic issues addressed by the Nixon administration. One of Nixon's few personal requests about the space program showed how trivial it was in his agenda. In one of his numerous scribbled notations on news summaries, in November 1970 Nixon asked his science and technology adviser to find out

about Alvin Toffler's book, Future Shock. This put the entire OST staff and prominent scientists on the PSAC to work interpreting a pop culture book. Here is part of their reply:

> Your inquiry . . . has stimulated a great deal of discussion and soul-searching among PSAC'ers and other in OST. An examination of several specific cases indicates that there is no evidence for the future shock phenomenon as described by Toffler. For example, our parents and grandparents who moved from the farms, first had railroads, electricity, autos and aircraft, and gave up fundamentalism under the impact of science and urbanization, experienced drastic change, yet they did not experience future shock. Stress or shock in individuals and societies appears to arise not from change itself but from a feeling of losing control over one's fate, which sometimes accompanies change. . . . It is indeed true that many people do feel that change is being imposed. The incomprehensibility of technology is a major source of this feeling. These conclusions do not suggest that the solution to the problem is simple. They do suggest that the situation can be remedied in part by providing broader, informed public participation in decision-making. . . . techniques are appearing which can help in forecasting the effects of technology and in tailoring it to human purposes. A number of us in OST have thoughts about means for increasing public participation in this process. One of the most effect would bring decision making as it affects

daily lives down to the state and local level in line [with?] the New Federalism. . . . People must have a feeling for both humanistic and scientific cultures. Not all people can have a foot in both camps, but they can be fans who know the score and can cheer or boo appropriately.

See David to Nixon, November 19, 1970; John R. Brown III to David, December 14, 1970; David to Nixon, February 22, 1971, all in David Papers, OST, SMOF, WHCF, NPM, NARA.

20. Memo by Thomas O. Paine, "Meeting with the President, January 22, 1970," January 22, 1970, NASA Historical Reference Collection.

21. Logsdon, "Space Program during the 1970s," p. 3, NASA Historical Reference Collection; Hoff, Nixon Without Watergate, pp. 510-12.

22. Thomas O. Paine to Nixon, February 26, 1969, WH President, Nixon, 1968-1972; President's Science Advisory Committee, The Space Program in the Post-Apollo Period (Washington, DC: Government Printing Office, 1967), p. 14; Logsdon, "Space Program during the 1970s," p. 5 (Townes report quoted); Hoff, Nixon Without Watergate, p. 615.

23. Nixon to Lee DuBridge, February 8, 1969; Nixon to Agnew, et al., February 13, 1969, David Papers, OST, SMOF, WHCF, NPM, NARA.

24. Agnew quoted in New York Times, July 17, 1969, pp. 1, 22; Logsdon, "Space Program during the 1970," p. 39, based on a December 29, 1970 interview by Logsdon with Mayo, NASA Historical Reference Collection. My research indicates that Agnew's lack of influence within Nixon's inner circle was evident from the very beginning on most issues with the possible exception of Native American Indian policy. His lack of influence on space policy was confirmed in May 6, 1983, interview with Ehrlichman by John Logsdon, NASA Historical Reference Collection.

25. John Logsdon interview with John Ehrlichman, May 6, 1963, pp. 26-27; Space Task Group, "The Post-Apollo Space Program: Directions for the Future," September 15, 1969, p. 3, NASA Historical Reference Collection.

26. After Nixon's election in 1969 the initial momentum for change in most domestic and foreign affairs came from such free-thinking outsiders as Robert Finch, Daniel Patrick Moynihan, Henry Kissinger, and later John Connally. All of these men appealed to Nixon's preference for bold action and broad conceptualization. With the exception of Robert Finch, none had been closely associated with him prior to his election as president. Political-broker insiders increasingly gained ascendancy over free-thinking outsiders within the first Nixon administration as his plans to reorganize became more corporate in nature and more central to his thinking. Gray flannel types-

-many of whom he had known for many years, such as John D. Ehrlichman and H.R. Haldeman, the president's two closest aides; Leonard Garment, the liberal Democratic counterpart to Moynihan among Nixon's insider advisers; Arthur Burns, counselor to the president and later head of the Federal Reserve Board; Melvin Laird, secretary of defense; John Mitchell, attorney general; George Shultz, secretary of labor and later head of the Office of Management and Budget; and businessman Roy L. Ash, chair of the President's Council on Executive Reorganization--all played the role of political-broker insiders.

27. Richard P. Nathan, "The 'Administrative Presidency'," The Public Interest 44 (Summer 1976): 41-44; Nixon, Memoirs, pp. 337-42, 351-56, 764-70.

28. Interview with Ehrlichman by John Logsdon, May 6, 1983, p. 22. Nixon compared Apollo 8 (the first circumlunar flight in December 1968) to two other "joyous things that had happened on [the same] day" in 1968: his daughter Julie's wedding and the release of the crew of the Pueblo. See Nixon, Memoirs, p. 329.

29. Logsdon, "Space Program during the 1970s," pp. 9, 45, 59-66.

30. Thomas O. Paine to Nixon, February 26, 1969, WH President, Nixon, 1968-1972, NASA Historical Reference Collection.

31. Peter M. Flanigan to Nixon (action memorandum), August 10,

1970 (with attachment of letter from Paine to Nixon, July 31, 1970), Box 9, Peter M. Flanigan Files, SMOF, WHCF, NPM, NARA. After Paine refused to stay on beyond September when asked by the Nixon administration, Flanigan urged Nixon to select Roger Lewis immediately as the new NASA administrator because he was everything Paine was not: "an excellent spokesman for NASA and the Administration. . . . [and] a competent administrator." Lewis turned the job down and none of the individuals suggested by Paine as his successor was given serious consideration by the White House except George Bush, who was about to loose his bid for the Senate from Texas. But Bush apparently did not want the job, thinking it not important enough, according to Flanigan's handwritten comments. At the time Flanigan did not want to hold the position for Bush until the results of the November election were in because "by not acting [now] . . . the Administration looks indecisive. In addition," Flanigan told Nixon, "it looks as if NASA and the Space Program were not considered important to the Administration. Given the current condition of the space industry, this would be an unfortunate inference." Many have argued that Paine resigned over NASA budget cuts, but newspaper accounts indicate that he had personal financial concerns. He could not send his four teen-age children to private schools for less than $15,000 and live in Washington on a salary of $42,500. This low salary, by corporate standards, was another reason why it took Nixon five months to replace him (New York Times, July

29, 1970, pp. 1, 16, Washington Post, July 30, 1970, p. A3, and The Economist, March 6, 1971, p. 59).

32. Paine memo for the record, January 22, 1970, about meeting on the same day with Nixon, Flanigan, and Ehrlichman, WH President, Nixon, Correspondence, 1968-1972, NASA Historical Reference Collection.

33. Nixon's PSAC discussed the possibility of reorganization as a way of making "full use of scientific and technological resources" and recommended that the president consult with the Ash Council about this. See David to Nixon, February 22, 1971, Box 27, David Papers, OST, SMOF, NPM, NARA. Nixon received two kinds of advice from the Ash Council. The first recommended horizontal and decentralized corporate designs, and stressed the "values of economy and efficiency, span of control, policies-administration dichotomies, straight lines of authority, and accountability," and the second had to do with management by objectives. It was on the basis of the first functional reorganizational principle that the Ash Council recommended as early as October 1969 relocating OST. The working papers of the Ash Council were among those opened by the National Archives in December 1986. Those which proved particularly important for this summary of government reorganization under Nixon can be found in Boxes 71-72, White House Central Files [WHCF], President's Advisory Council on Executive Organization [PACEO],

Nixon Presidential Materials [NPM], NARA. I have also utilized a 428-page bound, in-house summary of the all the recommendations made to Nixon by the Ash Council provided to me by John Whitaker, who served first as Nixon's cabinet secretary and later as under secretary of the Interior Department, entitled, "Memoranda of the President's Advisory Council on Executive Organization."

34. Hechler, Toward the Endless Frontier, pp. 511-13; Fries, "Ideology of Science," pp. 328, 330 (quotation), 332-36. In this article Fries also appears unaware of the influence of Watergate on testimony, of the importance of the Ash Council in all of Nixon's reorganizational proposals and New Federalist concepts, and the growing power of individual presidential advisers.

35. Richard Rose, Managing Presidential Objectives (New York: The Free Press, 1976), pp. 58-66.

36. Ibid., pp. 67-73, Larry Berman, The Office of Management and Budget and the Presidency, 1921-1979 (Princeton, NJ: Princeton University Press, 1979), pp. 85, 105-30; Larry Berman, "Office of Management and Budget That Almost Wasn't," Political Science Quarterly, 92 (1977): 298; Charles Warren, "The Nixon Environmental Record: A Mixed Picture," in Leon Friedman and William F. Levantrosser, eds., Richard M. Nixon: Politician, President, Administrator (New York: Greenwood Press, 1991), pp. 198-99.

37. For a summary of scientific opinion at the 1973-1974 hearings on Reorganization Plan No. 1, see Fries, "Ideology of Science," pp. 330 (first quotation) 332. For OMB's power, see Glenn P. Hastedt, American Foreign Policy: Past, Present, Future (Englewood Cliffs, NJ: Prentice-Hall, Inc., 2nd ed., 1991), pp. 116 (second quotation) 117. The first impoundment of allocated space funds occurred in 1972 when OMB withheld $24 million specifically earmarked for retrofitting existing aircraft with quiet engines. See Hechler, Toward the Endless Frontier, p. 759.

38. Willis H. Shapley to James C. Fletcher, January 9, 1973, January 22, 1973 (w/attached notes); George W. Low to Fletcher, April 23, 1973; Fletcher to William Proxmire, March 10, 1975; Larry J. Early memo on Shapley's comments on OMB and DOD, May 22, 1975; Fletcher to John E. Naugle, April 13, 1976, all in Administrators Papers, James C. Fletcher, NASA Historical Reference Collection. See also the interviews with Fletcher, 1972, 1977, 1991, NASA Historical Reference Collection.

39. George Mahon (D-TX), Chair of House Committee on Appropriations, to Fletcher, October 13, 1976, and Fletcher to Bill [William] Lilly, October 19, 1976 (quotation), WH President, Carter, Correspondence, 1976, NASA Historical Reference Collection. Also see Washington Star, May 2, 1978, p. A1. This newspaper story reported that one of the benefits from ZBB was that NASA had decided to "discontinue the individual testing of

space shuttle engine components prior to testing of complete system." In theory zero-based budgeting required agencies to justify continuing activities from scratch--from a minimum or zero base--instead of taking current outlays for granted and focusing on increases, as NASA officials had routinely done.

40. Hechler, Toward the Endless Frontier, p. 207; Fletcher interview with Sherrod, December 27, 1972, NASA Historical Reference Collection; Bilstein, Orders of Magnitude, p. 58.

41. Hechler, Toward the Endless Frontier, p. 191 (first quotations), p. 340 (second quotation).

42. Leonard Roberts, "A Study of Long-Range Planning in the National Aeronautics and Space Administration," pp. 10, passim, unpublished paper, Graduate School of Business, Stanford University, 1970, copy in NASA Historical Reference Collection.

43. A summary of George Mueller's original "integrated" plan can be found in NASA, America's Next Decade in Space, September 1969, p. 45ff, NASA Historical Reference Collection. The account of Paine's response to both the PSG material and Mueller's plan is taken from Logsdon, "Space Program during the 1970s," pp. 28-30, and is based on his interviews with the participants.

44. Paine to Nixon, February 12, 1969, and Paine, memorandum for

the record, January 22, 1970, (quotations), WH President, Nixon, 1968-1972, NASA Historical Reference Collection.

45. As examples of this see, Thomas O. Paine, to Spiro T. Agnew, September 12, 1969; N.S. Stoer, Economics, Science, and Technology Division, Bureau of the Budget, to Robert P. Mayo, Director, Bureau of the Budget, "Analysis of NASA Report to Vice President on Recent Interest/Reaction to the Space Program," October 2, 1969; D.A. Derman, Economics, Science, and Technology Division, Bureau of the Budget, to Robert P. Mayo, Director, Bureau of the Budget, "Budget Appeals Session for NASA, November 19, 1969; Paine to Robert P. Mayo, January 19, 1970, all in Record Group 51, Series 69.1, Box 51-78-32, NARA.

46. Russell C. Drew to DuBridge, May 15, 1969 (with attachment indicating May 16th meeting with Senators Richard B. Russell, Warren G. Magnuson, Margaret Chase Smith, and Congressman Alphonzo Bell), Box 35, David Papers, OST, SMOF, WHCF, NPM, NARA.

47. Black to Agnew, August 20, 1969, Seamans to Agnew, August 4, 1969, Seamans to DuBridge, September 5, 1969 (with attached September 4 letter to Russell C. Drew), Box 35, David Papers, OST, SMOF, WHCF, NPM, NARA; Logsdon, "Space Program during the 1970s," pp. 38-39, particularly his interview with Seamans.

48. White House Press Conference, September 16, 1969, Box 35, David Papers, OST, SMOF, WHCF, NPM, NARA; Logsdon, "Space Program

during the 1970s," pp. 20-21, 44-48, NASA Historical Reference Collection.

49. Logsdon, "Space Program during the 1970s," p. 50, 53, information based on his interview with Earl Rhode, NASA Historical Reference Collection; Mayo to Nixon, September 25, 1969; Kenneth Cole to Ehrlichman, et al., September 30, 1969; DuBridge to Kenneth Cole, October 13, 1969, all in Box 35, David Papers, OST, SMOF, WHCF, NPM, NARA. Mayo's criticisms were taken so seriously that Ehrlichman, Kissinger, Bryce Harlow, and Flanigan were all asked to review them.

50. All figures are from Logsdon, "Space Program during The 1970s," pp. 56-66, 69; Paine to Mayo, November 18, 1969, both in NASA Historical Reference Collection.

51. Bureau of the Budget Staff Paper, "NASA Tentative Allowance--1971 Budget," November 13, 1969, NASA Historical Reference Collection.

52. For Ford's and Carter's views, see article from Huntsville Times, September 14, 1976, and Ford campaign flyer--both attached to a note from EPA at NASA to Fletcher and Lovelace, November 1, 1976, and "White House Fact Sheet on U.S. Civil Space Policy," WH President, Carter, Correspondence, 1976, NASA Historical Reference Collection; New York Times, June 20, 1978, p. B4; Wall

Street Journal, October 12, 1978, p. 2; Washington Post, October 12, 1978, p. A5.

53. Nick MacNeil to Stuart Eizenstat, et al., January 31, 1977, Presidential Directive/NSC-37, May 11, 1978; Presidential Directive/NSC-42, October 10, 1978, copies in Jimmy Carter White House Files, NASA Historical Reference Collection; New York Times, June 20, 1978, p. B4; Wall Street Journal, October 12, 1978, p. 2; Washington Post, October 12, 1978, p. A5. See also John M. Logsdon, "opportunities for Policy Historians: The Evolution of the U.S. Civilian Space Program," in Roland, ed., A Spacefaring People, pp. 101-102 in which he discussed Carter's space views in relation to Eisenhower's and Nixon's, missing the point that Nixon's were essentially related to his geopolitical theories, specifically detente with the Soviet Union.

54. For details about this contract controversy see Clinton P. Anderson to George M. Low, September 17, 1970; Low to Anderson, September 29, 1970; Spencer M. Beresford to Low, September 29, 1970; Low to Flanigan, September 30, 1970, all in Flanigan Files, Box 9, SMOF, WHCF, NPM, NARA; New York Times, June 22, 1970, p. 44 (editorial critical of Paine's commencement address); and Chicago Sun Times, September 13, 1970 (article by Clark Mollenhoff criticizing Paine's role in the $50 million contract), inserted into the Congressional Record, September 18, 1970.

55. Fletcher's attitude was especially evident in the first interview conducted with him by Robert Sherrod in 1972. The quotations are from Fletcher interview with Logsdon, September 21, 1977, pp. 30, 32, NASA Historical Reference Collection.

56. Nixon, Public Papers, 1969, 1970 (Washington, DC: Government Printing Office, 1971), pp. 730 (1969), 252 (1970).

57. Low memorandum for the record on his and Fletcher's meeting with the president on January 5, 1972, January 12, 1972, Fletcher Files, NASA Historical Reference Collection.

58. Rice quoted in interview by Logsdon, November 13, 1975; and Roger Launius, "A Waning of Technocratic Faith: NASA and the Politics of the Space Shuttle Decision," unpublished 1991 paper, pp. 12-15, NASA Historical Reference Collection; Statement by Ralph E. Lapp to U.S. Senate Committee on Aeronautical & Space Sciences, April 12, 1972, p. 7; Robert H. Hood to H. Dale Grubb, April 13, 1972; Klaus P. Heiss and Oskar Morgenstern to Fletcher, October 28, 1971, all in NASA Historical Reference Collection. For full testimony see U.S. Senate, Hearings Before the Committee on Aeronautical and Space Sciences on S-3094, 92d Cong., 2d sess., March 22, 23, April 12, 14, 1972 (Washington, DC: Government Printing Office, 1972), pp. 1051-1109.

59. For specific reference to such activities see Fletcher notes, August 5, 1971; Fletcher to George Shultz, September 30,

1971; Fletcher to George M. Low, October 20, 1971, November 5, 1971, July 26, 1972; Fletcher to Caspar Weinberger, November 3, 1971, November 4, 1971; Fletcher to William Morrill, assistant director of OMB, October 2, 1972, all Fletcher Administrator Files, 1971 and 1972, NASA Historical Reference Collection. For Nixon's views see Fletcher interview with Logsdon, September 21, 1977, p. 26, NASA Historical Reference Collection.

60. Weinberger to Nixon (via Shultz), August 12, 1971, NPM, NARA.

61. Fletcher to Low, August 24, 1971, Fletcher administrator files, 1971, NASA Historical Reference Collection.

62. Interview with Weinberger by Logsdon, August 23, 1977; interview with Ehrlichman by Logsdon, May 6, 1983. Also see Launius, "Waning of Technological Faith," pp 15-20; and John M. Logsdon, "The Space Shuttle Decision: Technology and Political Choice," Journal of Contemporary Business 7 (Winter 1979): 13-30.

63. Franz Schurmann, The Foreign Politics of Richard Nixon (Berkeley, CA: Institute of International Studies, 1987), pp. 47-64, 84-90, 372-82. Schurmann makes a much more convincing case for Nixon's grand design than C. Warren Nutter does in Kissinger's Grand Design (Washington, DC: American Enterprise Institute for Public Policy Research, 1975).

64. Raymod L. Garthoff, Detente and Confrontation: American-Soviet Relations from Nixon to Reagan (Washington, DC: The Brookings Institution, 1985), pp. 33 (quotation)-36, 47; U.S. Congress, Senate Committee on Foreign Relations, Hearings on Detente, 93d Cong, 2nd sess., August-September, 1974, pp. 239, 301 (quoting Dean Rusk and Kissinger); Stevenson, Rise and Fall of Detente, pp. 6-11, 179-82, 188; Schurmann, Foreign Politics of Richard Nixon, pp. 80-81, 88. For the argument that detente simply reflected a continuation of George Kennan's ideas about containment, see John Lewis Gaddis, Strategies of Containment: A Critical Appraisal of Postwar American National Security Policy, (New York: Oxford University Press, 1982), p. 283 passim.

65. Nixon, Memoirs pp. 415-18; Schurmann, Foreign Politics of Nixon, p. 204.

66. Alexander Butterfield to Nixon, June 11, 1969, Butterfield Telephone Calls, August 1969, Bryce Harlow to Nixon, Box 2, July 1, 1969, President's Handwriting [hereafter PH]; Box 30, 8, 13, April 24, May 11, 1969, Box 30, Annotated News Summaries [ANS], President's Office Files [POF]; Nixon to Gerbert Klein, March 13, 1969; Nixon to Erlichman, April 10, 1969, Box 1, PPF, WHSF; J. Francis Lally to Nixon, June 10, 1969, Box 64, General [GEN] Foreign [FO], WHCF,NPM, NARA.

67. Low to Fletcher, August 12, 1971; Fletcher to Low, November 5, 1971, December 2, 1971, December 9, 1971; Fletcher to Low,

January 27, 1972; Fletcher to Joseph P. Allen, November 7, 1973; Low to Fletcher, October 16, 1974, all in Fletcher Administrator Files, 1971, 1972, 1973, 1974, NASA Historical Reference Collection. In his August memorandum to Fletcher, Low said: "Kissinger stated that stopping manned space flight in the United States is entirely unsatisfactory, and [that] he would do everything in his power to prevent this happening." Yet Kissinger's memoirs pay scant attention to matters involving space (the first over 1,000 page volume containing only seven page references to the Apollo program; the second even less), and the latest biography of him by Walter Isaacson contains only three brief references to Apollo flights--none of them substantive.

68. Norman P. Neureiter to Flanigan, March 31, 1971; Flanigan to Kissinger, July 23, 1971; Neureiter to David, July 26, 1971, all in Box 35, David Papers, OST; Philip H. Trezise to Donald B. Rice, October 20, 1971; U. Alexis Johnson to Kissinger, November 1, 1971; Kissinger to Flanigan, November 1, 1971; John B. Walsh to Kissinger, October 21, 1971, November 3, 1971, November 15, 1971; Kissinger to Johnson, n.d. [November 1971]; Theodore L. Eliot, Jr., to Kissinger, November 12, 1971, all in Box 9, Flanigan Files, SMOF, WHCF, NPM, NARA.

69. Russell C. Drew to David, October 20, 1970, David Papers, Box 35, OST, SMOF, WHCF, NPM, NARA; William P. Rogers to Nixon, April 29, 1972; John B. Walsh to Fletcher, May 5, 1972; NASA's

comments on Rogers' memorandum, April 29, 1972, all in Fletcher Administrator File, 1972, NASA Historical Reference Collection. The degree to which Rogers was outside of Nixon's inner circle of foreign policy advisors can be seen in this memorandum in which he questioned Nixon's emphasis on cooperating with European nations in space.

70. Paine to Nixon, February 12, 1969, February 26, 1969, March 26, 1969, November 7, 1969, January 9, 1970, June 23, 1970, July 31, 1970 (with attachments about NSDM 72); Kissinger to Paine, 10 February 1970; Flanigan to Paine, July 2, 1970, all in WH President, Nixon, 1968-1972, NASA Historical Reference Collection; John B. Walsh to Herman Pollack, February 18, 1972, Fletcher Administrator Files, 1972, NASA Historical Reference Collection.

71. Intelsat communication, n.d., giving history of the consortium; Leonard H. Marks, "Report of the U.S. Delegation to the Plenipotentiary Conference on Definitive Arrangements for Intelsat, February 24-March 21, 1969," both in Intelsat Files, NASA Historical Reference Collection; Robert J. Samuelson, "Intelsat: Flying High, but Future Course Uncertain," Science, April 4, 1969, pp. 56-57; "Remarks by Archer Nelson," Congressional Record, November 25, 1969, p. E100029-30; Katherine Johnson, "Japan, Australia Offer Intelsat Compromise," Aviation Week and Space Technology, March 2, 1970, p. 20; "Intelsat

Agreement Takes Shape," Astronautics and Aeronautics, December 1970, pp. 15-16; Executive Order 11277, April 30, 1966, designating the Intelsat consortium as an international organization, Weekly Compilation of Presidential Documents, April 1966, p. 600; President's remarks to Intelsat Plenipotentiary Conference, May 21, 1971, Weekly Compilation of Presidential Documents, May 24, 1971, pp. 786-87; Washington Star, March 22, 1970, p. D; New York Times, August 21, 1971, p. M; Space Daily, December 18, 1972, p. 209.

72. Paine to Nixon, January 9, 1970; Fletcher to Nixon, July 28, 1972, November 22, 1972, all in WH President, Nixon, 1968-1972, NASA Historical Reference Collection; Bilstein, Orders of Magnitude, p. 107; Hechler, Toward the Endless Frontier, pp. 208, 412.

73. Hechler, Toward the Endless Frontier, pp. 513-25, 605-54; Hans Mark, The Space Shuttle: A Personal Journey (Durham, NC: Duke University Press, 1987), Chapter 9 review policy during the Carter administration.

74. Hechler, Toward the Endless Frontier, pp., 185-89, 194-206 (Teague quoted on 196).

75. Fletcher to Moss, January 12, 1973, and February 23, 1973 (quotation); Interview with Fletcher by Robert Sherrod, December

27, 1972, p. 27, Fletcher Administrator Files, 1973, NASA Historical Reference Collection.

76. For representative correspondence over the contested contract see Utah Governor Calvin L. Rampton to the Utah Delegation and Fletcher, Robert Curtin, and Dale Myers, June 24, 1971; Russell Long to Elmer B. Staats at General Accounting Office [GAO], October 15, 1973; Staats to Long, November 14, 1973; A.H. von der Esch, Vice president of Lockheed, to GAO, December 5, 1973; Rep. Dante B. Fascell (D-FL) to Staats, GAO, December 21, 1973; GAO to Fletcher, May 9, 1974; Telegram to Fletcher from Senators Russell B. Long, Bennett Johnson, F. James O. Eastland, et al., May 16, 1974; M.J. to Moss (outlining chronology of correspondence over contract award to Thiokol from November 1973 to May 1974), May 22, 1974; Bob Allnutt to Moss, June 3, 5, and 12, 1974 (outlining NASA selection procedures)--all in Frank E. Moss Papers, Special Collections, University of Utah. The final granting of the contract to Thiokol came in 1975. See Fletcher to Nelson A. Rockefeller (as president of the Senate), March 24, 1975, Fletcher Administrator Files, 1975, NASA Historical Reference Collection.

77. Fletcher to Low, January 24, 1974, Fletcher Administrator Files, NASA Historical Reference Collection. For details of both debates see Hechler, Toward the Endless Frontier, pp. 191, 269-305, 410, 412-24, 1010. Interestingly, in 1993 similar arguments

were made by the new Clinton administration for cooperating with the Russians on a space station in order to save U.S. taxpayers money, only to meet objections based not on anticommunist arguments but on Russia's economic instability in the post-Cold War era. See International Herald Tribune, April 8, 1993, p. 1, April 16, 1993, p. 3.

78. Mondale quoted in Congressional Quarterly, February 26, 1972, p. 436 (others quoted on page 437). Also see Mondale, Proxmire, and Javits to their senate colleagues, May 9, 1972; Mondale to Clinton P. Anderson, April 25, 1972; Fletcher to Mondale and Anderson, April 25, 1972, all in Fletcher Administrator Files, NASA Historical Reference Collection; Congressional Record, May 11, 1972, pp. S.7698-S.7752.

79. Low to Fletcher, January 2, 1974; Fletcher to Low, January 7, 1974; Low to Boland, October 10, 1974; all in Fletcher Administrator Files, 1974, NASA Historical Reference Collection; Congressional Quarterly Almanac 1974, pp. 92, 94, 474-77; Congressional Quarterly Almanac 1975, pp. 811, 814; U.S. House, Boland report to Committee of the Whole House on the State of the Union, 94th Cong., 1st Sess., June 11, 1975, p. 56; Congressional Record, July 19, 1977, pp. H23668-H23677.

80. Hechler, Toward the Endless Frontier, pp. 1002, 1009-10. This greater cooperation was achieved in part because Fuqua gave "subcommittee chairmen more autonomy than they . . . had before,

without turning the committee over to them" (p. 1009). Fuqua also provided subcommittee heads with more staff assistance to accomplish their jobs.

81. Congressional Quarterly Almanac 1974, p. 474; 1979 Congressional Quarterly Weekly Report, April 28, 1979, p. 781; Statistical Abstract of the United States, 1992 (Washington, DC: Government Printing Office, 1992), p. 595. Of course, the $5.24 billion in funding in FY 1980 was worth far less than the $5.25 billion in FY 1965. In terms of 1991 constant dollars, the FY 1965 budget was over $21 billion while that for FY 1980 was slightly over $8 billion, according to the Report of the Advisory Committee on the Future of the U.S. Space Program (Washington, DC: Government Printing Office, 1990), p. 4.

82. Fletcher to Low, February 6, 1975, Fletcher Administrator Files, 1975, NASA Historical Reference Collection; Wall Street Journal, February 25, 1977, March 7, 1977.

Chapter 5

Politics not Science: The U.S. Space Program in the Reagan and Bush Years

by

Lyn Ragsdale

With American flags flying seemingly everywhere, Ronald Reagan stood before an audience of fifty-thousand people at Edwards Air Force Base, California, on the Fourth of July 1982 to welcome the return of the Space Shuttle Columbia and its crew. This marked the last test flight for the shuttle program which would begin a regular schedule of commercial and government flights. Likening the Space Shuttle to the Yankee Clipper of the early Republic, Reagan spoke of a "national space policy" that would "look aggressively to the future by demonstrating the potential of the shuttle and establishing a more permanent presence in space." The crowd cheered as Reagan suggested that "our freedom, independence, and national well-being will be tied to new achievements, new discoveries, and pushing back new frontiers" in space exploration.[1]

Reagan's remarks, certainly apropos to the symbolism and ceremony of the day, were nonetheless misleading. During the twelve years that the U.S. Congress and the Reagan and Bush administrations made decisions about space, there was no national space policy. What might generally be considered a national space policy was not policy, it was not about space, and it was

not national.

Decisions about the space program did not constitute policy, if policy is defined by a reasonably well-thought out plan of action to achieve a relatively well-defined goal. Instead during the 1980s, decisions were made to pursue projects "by the yard" rather than comprehensively so they could be sold to a cost-conscious White House and Capitol Hill.[2] In addition, decisions were made about matters unrelated to the space program--budget deficits, massive military spending, and the size of the federal pork barrel--that nonetheless shaped the space program.

During the Reagan and Bush administrations, the two presidents and Congress did not have space policies; they had only political ones. At the root of public officials' choices about the space program were political calculations about what they could support on behalf of American taxpayers. Similarly, at the root of officials' choices at the National Aeronautics and Space Administration (NASA) were political calculations about how best to sell technologically complex projects, the immediate benefits of which were not always obvious. Politics created a set of expectations about what NASA should be able to accomplish based on commitments the agency itself made and budgets the president and Congress offered. Politics posed an especially keen irony for the space program during Reagan's second term. A president who normally touted large budget cuts, supported relative increases for NASA--especially for its key programs--

because this continued to send a message to the Soviets about American superiority in space. A Congress, which resisted large budget cuts overall, supported cuts for NASA in favor of funding domestic programs.

As a result, no one national direction for U.S. space programs characterized the Reagan and Bush years. The two presidents and Congress moved in independent directions regarding matters of space. Indeed, the term "the Reagan and Bush years" is only a descriptive convenience. Reagan was not Bush and Bush was not Reagan on space programs. In addition, the phrase obscures that Congress was an equal player with the presidency on space issues during this period. Decisions that emerged were typically the result of compromises that left many matters unresolved. What may be labeled a "national" policy was more a diverse product of competing fiefdoms among NASA, the president, the White House staff, congressional committees, subcommittees, and individual members of Congress.

This chapter considers the tangle of decisions regarding the U.S. space program during the Reagan and Bush administrations and the corresponding 97th-102d Congresses. It analyzes in detail three key events of the space program during the period:

(1) the launching of the Space Shuttle in 1981,

(2) the explosion of the shuttle Challenger in 1986, and

(3) the development of the space station beginning in 1984.

In so doing it examines why these three milestones contributed to a space program that was not policy, was not about space, and was

not national. The chapter concludes with a brief discussion about the Bush administration's plan to return to the Moon and begin exploration of Mars scuttled by Congress and the Clinton administration's and the 103d Congress' approach to space initiatives.

Billions to Spare: The Space Shuttle, 1981-1985

The 1980s began with NASA, a beleaguered agency, facing tough questions: What kind of space program did the United States need? Or did it need one at all? The triumph of the Apollo Moon missions seemed a dim memory. Indeed NASA officials worried that in Apollo's success were the seeds of the organization's self-destruction. The public's interest in astronauts had waned as its interest in fiscal restraint had peaked. Thomas O. Paine, NASA administrator in the late 1960s, reflected that "the American people . . . didn't give a damn. By then, hell, we had been to the Moon. What do you care if we fly another orbital flight or not. We know we can do it."[3] Instead the watchwords of the Reagan administration were smaller government and budget cuts. President Reagan accused government of "not solving the nation's problems, but being the nation's problem."[4]

NASA had spent the 1970s building the Space Shuttle, a partially-reusable two-stage spacecraft consisting of a booster and an orbiter. After the success of the Moon landing in 1969, NASA officials had urged that "the next logical step" in the space program was to develop a space station and explore Mars.[5]

When the Nixon administration rejected these grand policy innovations, NASA administrator James Fletcher pushed for the shuttle as a more politically feasible alternative. "The only way to go," he decided, "was some sort of shuttle."[6]

The shuttle held several advantages for NASA. First, it continued NASA's emphasis on manned space flight, which many in the agency felt was at the heart of its past glory and, therefore, its future survival. Fletcher argued in a letter to Caspar Weinberger, then Nixon's deputy director of the Office of Management and Budget, that "The shuttle provides the capability for a continuing U.S. manned space flight program, a capability we believe to be essential--without flying men just for their own sake."[7] Walter Mondale, a vocal shuttle critic of the shuttle as senator from Minnesota, spoke more harshly: "There was this whole empire of people left over from the Apollo program with nothing to do. And to sustain their efforts, they needed show business. And manned flight was the drama."[8] The shuttle offered NASA an optimal program: it preserved human space missions without the immense cost of space stations and flights to Mars.

Second, the shuttle protected the future of the space station. NASA officials viewed the shuttle and the space station as inseparable. Although the station might not be the very next step, it could be an eventual step when the shuttle was in operation. How, so the logic went, could the Space Shuttle be developed without it some day serving as transportation for the

space station.

Third, according to Fletcher, "The United States urgently needs the space shuttle to provide 'routine' access to near-earth space."[9] Ironically, the novelty was the routine aspect of the shuttle's flights. Shuttle flights to launch military and commercial satellites and to perform hundreds of scientific experiments would be frequent, like regularly scheduled air travel. This argument helped promote the shuttle to the Department of Defense (DOD) which NASA succeeded in courting as one of its prime customers.

Fourth, the shuttle would help shore up the aerospace industry after the halcyon days of Apollo. Fletcher told the Nixon White House that "an accelerated start on the shuttle would lead to a direct employment of 8,800 by the end of 1972 and 24,000 by the end of 1973." Moreover, as Nixon aides calculated, this job growth would occur in several states crucial to Nixon's 1972 reelection bid.[10]

Finally, NASA made cost effectiveness the chief selling point for the shuttle program with a wary White House and Capitol Hill. An independent report had concluded that cost should not be the chief criteria "to justify [the shuttle's] desirability."[11] But NASA contended that not only would the shuttle offer routine trips to space, it would also be reusable with the cost of its development and operation paid for by its customers "with billions to spare."[12] According to NASA, the shuttle would be cheaper in the long run than expendable launch

vehicles (ELV). Thus, NASA touted the shuttle as a good investment. Fletcher presented a fact sheet to a Congressional committee: "If, as is likely, new useful and economically beneficial mission possibilities open up during the 1980s because of the routine and quick access to space the shuttle provides, the investment will be returned many times over."[13] Nixon ultimately agreed, saying "it will take the astronomical costs out of astronautics," and formally approved a total budget of $5.15 billion in 1972 to develop the manned space vehicle.[14]

The justifications NASA offered for the shuttle program in the early 1970s became the criteria upon which its success and that of the entire space program were judged in the 1980s. With the first test flight of the shuttle Columbia on April 12, 1981, NASA embarked on a new era of manned space effort that was not guided by any fully-developed, consensus national space policy. What was fundamentally missing in the activity was any emphasis on the scientific advances it offered. Beyond providing routine flights to space, the scientific payoff of the shuttle was not fully outlined. The space science board of the National Academy of Science concluded that "It is clear that space science and applications by themselves are insufficient to justify the cost of developing the shuttle."[15] In the ensuing decade the president did not develop a coherent, long-term strategy for scientific and technological achievements using the shuttle.

Ancillary Policy and Primary Policy

In place of a national space policy was what might be called

an "ancillary policy" based on compromises between political realities and technological abilities and on conflicts among government institutions more interested in political rewards than technological advances. Ancillary policy involves three dimensions. First, it is marked by an ongoing but secondary governmental commitment to an initiative that is not a top national priority. Second, ancillary policy is driven by a universal, but usually erroneous, political expectation that great things can be accomplished for very little. Third, the policy is shaped by institutional conflicts which arise from jurisdictional disputes, clashes of personality, and ambiguous decision making and foreclose a national, comprehensive profile.

Ancillary policy can only loosely be termed "policy." Policy is typically viewed as a plan of action to solve an identified problem. Instead ancillary policy is more aptly a continuing government commitment, which exists for its own sake, not necessarily to solve a problem. Moreover, the commitment is of secondary importance to the public and public officials. Ancillary policy stands in contrast to "primary policy" that breaks with past decisions and perspectives to meet the nation's top priorities. These high priority issues dominate public attention, public funds, and the deliberations of public officials. Primary policy is a policy of innovation, while ancillary policy is one of continuation.

In the 1960s space policy was primary policy. President Kennedy announced in 1961 that America's goal in space was to

land men on the Moon by the end of the decade. That mission, framed as part of a race between the United States and the Soviet Union, gave the nascent space program a clear direction and purpose. It was a policy of innovation, existing where nothing of a similar magnitude had existed before. There was general agreement on Capitol Hill, at the White House, and in the country on the singular goal.[16] Although the goal held clear political implications, it was also a matter of scientific exploration as the nation worked to land on the Moon. In short, there was a national space policy.

Yet a great deal changed in the next two decades as President Reagan stood on the tarmac at Edwards Air Force Base. After 1969, ancillary policy replaced primary policy in the space program. With old ground already broken, new ground was developed with fewer grand strokes. Three characteristics of ancillary policy more precisely distinguished the space program generally and the shuttle program specifically in the 1980s: (1) low agenda status, (2) budgetary incrementalism, and (3) modest political support.

Low Agenda Status

Ancillary policy always has a low agenda status.[17] It is a matter of modest continuing importance, which generates little concern among policy makers about long-term goals or directions. Instead, policy makers discuss immediate costs and benefits. There is an imbalance in these discussions between those policy makers with vested interests in the policy and other policy

makers who have little interest in the policy. The former group, of course, has much greater sway over the policy than the latter. As a result, it is difficult to organize opposition to ancillary policy.

At the outset of the Reagan administration, the shuttle program was in midstep. It had been an ongoing part of the governmental agenda for nine years. The program was not highly visible, but it never disappeared. Public officials gave little attention to the shuttle's long run launch capability or the future of space transportation. In its report released in 1990 the Advisory Committee on the Future of U.S. Space Programs found that "the most significant deficiency in the nation's future civil space program is an insufficiency of reliable, flexible, and efficient space launch capability."[18] Yet little notice was given this issue because correcting it would require a consensus about long-term plans and priorities, a consensus that ancillary policy avoids. Instead, the focus was on the near term. Members of Congress from states with NASA and aerospace facilities were not surprisingly the shuttle's chief sponsors, many of whom had considerable influence over the course of shuttle policy. Opposition arose about cost overruns, but was not especially organized or successful.

Budgetary Incrementalism

Ancillary policy also entails incremental funding. Although shifts occur at the margins, the ongoing governmental commitment, at the heart of such policy, mandates continued albeit stable

resources. Incremental funding for NASA, as shown in Table 1, demonstrates that the budgets for the Space Shuttle and other "big-ticket" projects such as Space Station Freedom were relatively steady throughout Reagan's first term during which the greatest pressure for budget cuts was felt. After the Challenger explosion, shuttle funds increased and continued to do so during the Bush years. Space station funding also increased incrementally, on average 57 percent annually from fiscal year (FY) 1985 to fiscal year 1991.

Table 1
Space Shuttle and Space Station Funding,
(FY 1982-FY 1991, in billions)

Fiscal Year	Space Shuttle*	Space Station
1982	3.105	--
1983	3.567	--
1984	3.494	--
1985	3.493	.146
1986	3.304	.185
1987	3.779	.309
1988	4.251	.490
1989	4.791	.877
1990	5.160	1.715
1991	4.991	1.931

*Figures total funds for shuttle production, capability development, and operations.

SOURCE: Successive volumes of Budget of the United States.

One may well argue that although these showcase items were spared, NASA's overall budget was not. Yet several aspects of an incremental budget picture for the entire space program suggest

that this notion does not bear scrutiny. As one feature, NASA's portion of the federal budget did not significantly erode during the Reagan and Bush years. Indeed, there has been little change in the funding of the space program relative to other portions of the federal budget since the 1970s. NASA commanded 4.4 percent of the federal budget in FY 1966, its largest percentage; this dropped to 1.3 percent by FY 1973 and 1.0 percent in FY 1976. NASA's federal budget share was eight-tenths of one percent in fiscal 1982 when Ronald Reagan took office and was estimated to be 1.1 percent for fiscal 1993 when George Bush left office.[19]

As a second feature, data in Table 2 reveals that NASA's space funding (in current dollars) increased gradually during the Reagan and Bush years. Many portrayed David Stockman, Reagan's first director of the Office of Management and Budget, as out to get the space program when he announced a $600 million cut from Carter's proposed FY 1982 budget. Yet, as Stockman himself observed: "NASA was hardly suffering. Even with the cut, its 1982 budget would be 11 percent higher than 1981."[20] Indeed, NASA's budget more than doubled from FY 1982 to FY 1991 even after the imposition of the Gramm-Rudman-Hollings Balanced Budget and Emergency Deficit Control Act of 1985. The increases were especially true in the aftermath of the Challenger explosion. There was a 51 percent increase in total NASA funding from FY 1987 (the year in which funds were allocated to rebuild the shuttle) to FY 1993. Incrementalism is also discernible across the entire history of the agency. As Table 2 shows, NASA's space

budget nearly doubled each year for five years from FY 1959 to FY 1964 and peaked in 1965 in the heyday of the Apollo program (column 2). But it dropped slowly, not precipitously, thereafter. There was a decade of modestly declining resources from FY 1965 to FY 1974 with the largest percentage loss of 13.7 percent from FY 1968 to FY 1969. Thereafter, funds increased as steadily as they had decreased during the decade before.

Table 2
U.S. Space Budget in Current Dollars
1959-1993
(Budget Authority in Billions of Dollars)

Fiscal Year	NASA Total	NASA Space	Defense	Other	Total Space
1959	0.331	0.261	0.490	0.034	0.785
1960	0.524	0.462	0.561	0.043	1.066
1961	0.964	0.926	0.814	0.068	1.808
1962	1.825	1.797	1.298	0.200	3.295
1963	3.673	3.626	1.550	0.259	5.435
1964	5.100	5.016	1.599	0.216	6.831
1965	5.250	5.138	1.574	0.244	6.956
1966	5.175	5.065	1.689	0.217	6.971
1967	4.966	4.830	1.664	0.216	6.710
1968	4.587	4.430	1.922	0.177	6.539
1969	3.991	3.822	2.013	0.141	5.976
1970	3.746	3.547	1.678	0.115	5.340
1971	3.311	3.101	1.512	0.127	4.740
1972	3.307	3.071	1.407	0.097	4.575
1973	3.406	3.093	1.623	0.109	4.825
1974	3.037	2.759	1.766	0.116	4.641
1975	3.229	2.915	1.892	0.107	4.914
1976	3.550	3.225	1.983	0.111	5.319
TQ	0.932	0.846	0.460	0.310	1.340
1977	3.818	3.440	2.412	0.131	5.983
1978	4.060	3.623	2.738	0.157	6.518
1979	4.596	4.030	3.036	0.178	7.244
1980	5.240	4.680	3.848	0.160	8.688
1981	5.518	4.992	4.828	0.158	9.978
1982	6.044	5.528	6.679	0.234	12.441
1983	6.875	6.328	9.019	0.242	15.589
1984	7.248	6.648	10.195	0.293	17.136
1985	7.573	6.925	12.768	0.474	20.167
1986	7.766	7.165	14.126	0.368	21.659
1987	10.507	9.809	16.287	0.352	26.448
1988	9.026	8.302	17.679	0.626	26.607
1989	10.969	10.098	17.906	0.440	28.444
1990	13.073	12.142	19.382	0.330	31.854
1991	14.647	13.603	20.443	0.373	34.419
1992(est.)	15.088	NA	NA	NA	NA
1993(est.)	15.858	NA	NA	NA	NA

Source: Aeronautics and Space Report of the President, Fiscal Year 1991 Activities (Washington, DC: NASA, 1991), p. 180.

As a third feature, data in Table 3 shows the steady

increases in NASA's budget during the Reagan and Bush years, even with the effects of inflation controlled. Although NASA's constant dollar budget dropped sharply after FY 1965, it stabilized by FY 1974 and remained relatively constant until FY 1982--the first Reagan budget year--when it actually began to increase. The increases grew even more in the Bush years. As the figure makes plain in its comparison of NASA's budget in current dollars and in constant 1982 dollars, the increases in funding were real and not eaten away by inflation.

As a final feature, employment remained steady during the Reagan and Bush years. As shown in Table 4, the number of employees at the start of Reagan's first term was nearly equal to the number of personnel at the end of Reagan's second term (23,039 in 1981 and 23,130 in 1988). The payroll actually increased slightly during Bush's term.

Table 3
U.S. Space Budget in Constant Dollars 1959-1993
(Budget Authority in Billions of 1982 Dollars)

Fiscal Year	NASA Total	NASA Space	Defense	Other	Total Space
1959	1.134	0.894	1.678	0.118	2.689
1960	1.766	1.557	1.892	0.146	3.595
1961	3.220	3.093	2.718	0.228	6.039
1962	6.029	5.937	4.289	0.660	10.886
1963	11.992	11.839	5.060	0.844	17.744
1964	16.421	16.152	5.150	0.695	21.997
1965	16.621	16.266	4.983	0.773	22.021
1966	15.939	15.599	5.202	0.667	21.467
1967	14.862	14.457	4.979	0.646	20.082
1968	13.179	12.727	5.521	0.509	18.758
1969	10.879	10.419	5.487	0.384	16.290
1970	9.642	9.130	4.320	0.296	13.746
1971	8.165	7.648	3.729	0.314	11.691
1972	7.906	7.343	3.364	0.231	10.938

1973	7.667	6.963	3.653	0.245	10.861
1974	6.162	5.597	3.583	0.235	9.415
1975	6.003	5.420	3.518	0.198	9.136
1976	6.238	5.667	3.485	0.195	9.347
TQ	1.637	1.492	0.809	0.054	2.355
1977	6.296	5.673	3.977	0.216	9.866
1978	6.220	5.550	4.195	0.241	9.986
1979	6.342	5.562	4.189	0.245	9.996
1980	6.367	5.687	4.676	0.195	10.557
1981	6.059	5.482	5.301	0.173	10.956
1982	6.255	5.721	6.912	0.243	12.876
1983	6.896	6.347	9.046	0.242	15.635
1984	6.965	6.389	9.797	0.281	16.467
1985	7.027	6.426	11.849	0.440	18.715
1986	7.090	6.542	12.897	0.336	19.775
1987	9.246	8.632	14.332	0.310	23.274
1988	7.636	7.024	14.956	0.529	22.509
1989	8.852	8.149	14.450	0.355	22.954
1990	10.014	9.300	14.847	0.253	24.400
1991	10.751	9.984	15.005	0.274	25.263

Source: Calculated by the author adjusting Table 2 for inflation.

Although some supporters of NASA lament the agency's "lean" budgets during the Reagan and Bush years, this predicament seems exaggerated.[21] NASA may, however, have had less budgetary flexibility with the ancillary policy of the 1980s than it had with the primary policy of the 1960s. Yet, incrementalism as a feature of ancillary policy indicates that funding neither soared nor stopped. The agency's size and shape were not so radically altered as to make the agency or its programs unrecognizable.

Table 4
NASA Civilian Employment, 1959-1992

		Full-time Employees	% Change from Previous Year
Eisenhower			
	1959	9,235	--
	1960	10,232	10.8
Kennedy			
	1961	17,471	70.7
	1962	23,636	35.6
	1963	29,934	26.4
Johnson			
	1964	32,499	8.6
	1965	34,049	4.8
	1966	35,708	4.9
	1967	35,860	.4
	1968	34,641	-3.4
Nixon			
	1969	33,929	-2.1
	1970	32,548	-4.1
	1971	32,506	-6.3
	1972	28,382	-7.0
	1973	26,777	-5.7
Ford			
	1974	26,686	-.3
	1975	26,447	-.8
	1976	26,244	-.7
Carter			
	1977	24,435	-6.9
	1978	24,056	-1.6
	1979	23,614	-1.8
	1980	23,714	.4
Reagan			
	1981	23,039	-2.8
	1982	22 563	-2.2
	1983	22,784	1.0
	1984	22,085	-3.0
	1985	22,562	2.2
	1986	22,244	-1.4
	1987	22,950	3.2
	1988	23,130	.8
Bush			
			198924,1654.5
	1990	24,872	2.9
	1991	25,521	2.6
	1992	25,684	.6

Source: For 1959-1990, Statistical Abstract of the United States; for 1991-1992, Federal Civilian Workforce Statistics, Employment and Trends.

Moderate Political Support

Ancillary policy inspires political support based on practicality rather than sheer enthusiasm. The policy is not a key Congressional, presidential, or public priority. Congressional support for the space program generally and the shuttle more specifically shifted from a national to a more local perspective: how will the policy benefit particular states and districts? Presidents Reagan and Bush gave little personal attention and only limited public visibility to the policy, although they were more active than some of their predecessors. In addition, public opinion was generally, but not overwhelmingly, positive. In 1981, 40 percent of the public said that the United States should "do more" in space, while only 25 percent felt it should "do less." This was the highest support noted since 1965, at the heighth of Apollo. The next highest level of support occurred in 1968, the year before the Moon landing, when 30 percent of Americans thought that the government should do more.[22] During the Reagan and Bush years, favorable opinion remained relatively constant. In answer to a somewhat different question, on average from 1984 to 1991, 23 percent of Americans said that space program spending should be increased, 44 percent said spending should remain the same, 24 percent felt it should be decreased, and 6 percent wanted the program ended altogether.[23] In 1991, 61 percent of Americans believed that the space shuttle program had been "a worthwhile and important program" for the country, while 36 percent felt "the money would have been better spent in some other way." Yet, when asked whether the space program should concentrate on unmanned versus

manned missions, a significant number of people favored the unmanned option: 39 percent compared to 49 percent for manned efforts like the Space Shuttle.[24]

Big Science--Small Policy

Thus, ancillary policy posed a central contradiction for NASA. The shuttle was a "big science" project--an innovative, technologically sophisticated, megaprogram that would take years to develop, years to run, and years to perfect. Yet within the framework of ancillary policy, the shuttle had to be done cheaply and incrementally; it had to match the vested interests of a few and not upset other interests of the many; it had to be done with public support, but without national excitement. The Space Shuttle program was big science crammed into small policy.

The Politics of Expectation

It is unclear whether big science can succeed as ancillary policy, which removes the moorings of long-term planning from policy making and substitutes the politics of the moment. Politics, rather than the substance of the policy, drives decisions. Ancillary policy fosters two opposing sets of political expectations. First, it creates low expectations regarding means. Absent a consensus on a long-term commitment to space, the questions "What can we afford?" and "How can we sell it?" replaces "What should we do?" Second, ancillary policy creates high expectations regarding ends, for the very reason that the ends are never fully addressed. Although the government is committed to only one portion of a project at a time, there is nonetheless a vision of what the finished project will look like. But because of the low expectations about means, the vision may

be far more grandiose than what can ultimately be achieved.

These antithetical expectations created a vicious circle for NASA between what the agency needed to promise to win political support for the shuttle program and what it needed to adequately build and run the shuttle. Ancillary policy pushed NASA to compromise the end--the feasibility of the project--in order to obtain the means--the political support--to carry it out. A Reagan budget official remarked that "I think they [NASA] have allowed their political assessment of what they have to do to get support to interfere with their scientific judgment."[25]

As initially approved, the shuttle program was to cost a little more than $5 billion and be flying by 1978. By President Reagan's inauguration, the shuttle program had overrun its budget, costing $14.7 billion (not accounting for inflation) from fiscal 1973 to fiscal 1981, and had taken three years longer to build than anticipated.[26] More important, the orbiters' cost per launch, projected at $26 million, exceeded $270 million; their cost per payload pound, estimated at $270, reached $5,264.[27] The shuttle had been expected to make at least 25 flights per year, but it never exceeded nine (in 1985) and totaled 42 for the decade from 1981 to 1991.[28] NASA had promised shuttle flights would be frequent, cheap, and manned. Instead, they were occasional, expensive, and manned. What happened between the planning of the shuttle and its launching? NASA created two expectations regarding means about the shuttle in the 1970s left unfulfilled in the 1980s: cost effectiveness and a fast launch schedule. Politics surrounding these expectations, not the technological facets of space transportation, became a focus of

the shuttle program.

Cost Effectiveness

Big science is by definition high priced. But NASA wanted to present the shuttle as big science made affordable. During tight budget times, the Office of Management and Budget (OMB) wanted it cheap. Congress wanted it to pay for itself by charging commercial and military users. NASA promised both--a program that was too good to be true and one no politician could resist. The agency pursued, as one observer put it, the "myth of the economic shuttle."[29] "We had to argue that it was cheaper," a NASA official noted. "It would be cheaper than the expendable launch vehicles. It would be better than all the expendable launch vehicles."[30] Political scientist Maureen Casamayou concluded that NASA "may have felt compelled to adopt this kind of strategy because . . . it was the only way to save . . . [the] organization from serious cutbacks and loss of turf."

The strategy meant that NASA offered Congress and OMB "buy-in numbers"--projected costs that were too optimistic and ultimately had to be revised upward later. As Max Faget, one of NASA's premier engineers, remarked, "If you don't quote a low cost, you ain't going to get it to begin with."[31] Rep. Bob Traxler (D-MI), chair of the House Appropriations subcommittee that funded NASA's budget also acknowledged the strategy: "Mega-science projects are intentionally sold to us with a low price tag, with the understanding that as the project begins to gain momentum, it gains friends within the Congress and outside in industry, and that those kind of supporters will be able to roll the high numbers."[32]

Although the low figures helped NASA sell the shuttle program, the agency also paid a price for the estimates. Shuttle economics depended on a tradeoff between development and operating costs to keep within the $5 billion ceiling. High or increasing development costs had to be offset by projecting relatively low operating costs. Rising operating costs had to be balanced by cutting back on development costs. Initially, NASA lowered development costs by abandoning a fully reusable shuttle in favor of a semireusable shuttle. To decrease development costs further, the agency eliminated some $500 million in safety and other tests.[33] C. Thomas Newman, a NASA comptroller, observed that unlike the fully tested Apollo program, "The shuttle set out some different objectives. To produce a system of moderate costs, the program was not as thoroughly endowed with [safety] test hardware."[34] To make operating costs look as attractive as possible to Congress and OMB, NASA crafted a series of numbers about costs, flights, and payloads that would not stand careful scrutiny. An OMB assistant director commented: "What needed more attention and never got any more attention was a good careful scrubdown of the operating costs. The number[s] that NASA was carrying around [were] absurd."[35] The results were cost overruns and missed budget projections.

But the cost overruns were more than the result of an external political strategy coming back to haunt NASA. They were also the result of internal practices, which included, according to auditor in NASA's Inspector General Office, the absence of competitive bidding, the failure to negotiate price agreements before work began, impractical deadlines, design changes in the

middle of construction, and building parts before the completion of their design and testing.[36] For instance, in 1982 an internal NASA audit uncovered problems with the development of the shuttle's external fuel tank, the cost of which had more than tripled, to $502 million, from its original estimates. The auditors found over 2,700 changes in components of the tank which were often purchased, fitted, ripped out, and then redone. They concluded that the "current external tank management is not cost effective and, in our opinion, is a microcosm of the overall shuttle program management difficulties."[37]

The General Accounting Office (GAO) echoed the concerns of the NASA auditors in a series of reports which deemed as "generally ineffective" NASA's systems to track and correct financial, equipment, property, and management problems.[38] One of the biggest problems uncovered by GAO auditors was NASA's inability to monitor the work of thousands of contractors paid billions of dollars to manufacture and maintain the shuttle. Even though NASA's procurement regulations specified that a price agreement be reached before work began, contractors often started and, at times, finished projects before costs were determined. Auditors disclosed that the main shuttle contractor, Rockwell International, working without a price agreement, spent $20 million on a propulsion system which NASA had anticipated would cost $3.2 million. Eventually NASA paid Rockwell $19.2 million.[39]

Excessive contract spending forced NASA to cut its own staff, including those whose job it was to specifically monitor contractors, to meet budget targets. While NASA had 28 contract

monitors at the Johnson Space Center during the Apollo program, by 1981 there were only two. One person monitored the 44,700 purchase orders Rockwell issued in 1981.[40] This contributed to shuttle management problems, which in turn fueled cost ineffectiveness.

Fast Launch Schedule

The economic shuttle myth not only created unrealistically low estimates of development and operation costs, but it also established an unrealistically high launch rate. NASA originally predicted 60 flights per year, although this was soon downgraded to 50. By 1986, the number had dropped to 24 flights annually, although, as noted above, there had been no more than nine flights in any one year. Some senior astronauts warned that anything more than nine would actually jeopardize the safety of the program, because of the long time needed between flights for maintenance and preparation.[41] The high launch rate depended on a shuttle monopoly over all military, domestic, and international customers. NASA secured a policy commitment from Congress that all U.S. space ventures, whether military, commercial, or scientific, be required to use the shuttle. In order to recoup shuttle costs, Congress established a pricing policy that amounted to $71 million a ride in the mid-1980s.[42]

Yet two circumstances defied this expectation: competition from abroad and demands from the Defense Department. The European Space Agency's Ariane unmanned launch system attracted well over $1 billion of business from Japan, the Soviet Union, and the People's Republic of China. NASA found it difficult for the shuttle to be competitive, because its payload prices

exceeded those of Ariane.[43] In addition, Congress approved an Air Force request for $2.1 billion to build ten new Titan IV rockets in fiscal 1986 before the Challenger explosion and permitted the modification of 13 existing Air Force intercontinental ballistics missiles for satellite launches. After Challenger, Congress approved $2.5 billion for another 25 Air Force ELVs.[44] A comparative analysis of NASA and DOD space budgets indicates that there was a dramatic increase in the budget for the Defense Department's space activities beginning with fiscal year 1982 when the Pentagon's space budget surpassed NASA's for the first time. As seen in Table 5, Defense Department spending on space activities accounted for 54 percent of total federal spending on space in 1982 compared to NASA's 44 percent. Thereafter, DOD spending rose much faster than that of NASA, even when controlling for inflation. This continued through the Bush years. The increase reflected a recognition that the four shuttle orbiters, regardless of their launch schedules, could not handle the volume of Pentagon business created primarily for aspects of President Reagan's strategic defense initiative, or "star wars." Thus, although there was significant pressure to accelerate the shuttle program's launch schedule, the schedule was not fast enough to make it commercially viable or meet the Pentagon's demands for military payloads.

Table 5
Total Space Budget by Agency, 1959-1991
(in percent)

Fiscal Year	NASA	DOD	Other
1959	33.2	62.4	4.4
1960	43.3	52.6	4.1
1961	51.2	45.0	3.8
1962	54.5	39.4	6.1
1963	66.7	22.7	10.6
1964	73.4	23.4	3.2
1965	73.9	22.6	3.5
1966	72.7	24.2	3.1
1967	72.0	24.8	3.2
1968	67.9	29.4	2.7
1969	64.0	33.7	2.3
1970	66.4	31.4	2.2
1971	65.4	31.4	3.2
1972	67.1	30.8	2.1
1973	64.1	33.6	2.3
1974	59.4	38.1	2.5
1975	59.3	38.5	2.2
1976	60.6	37.3	2.1
1977	57.5	40.3	2.2
1978	56.2	42.0	1.8
1979	55.6	41.9	2.5
1980	53.9	44.3	1.8
1981	50.0	48.4	1.6
1982	44.4	53.7	1.9
1983	40.6	57.9	1.5
1984	38.8	59.5	1.7
1985	34.3	63.3	2.4
1986	33.1	65.2	1.7
1987	37.1	61.6	1.3
1988	31.2	66.4	2.4
1989	35.5	63.0	1.5
1990	38.1	60.8	1.1
1991	39.5	59.4	1.1

Source: Calculated by the author from Table 1.

Oversold and Underfunded

The economic shuttle myth, then, was just that--a myth. NASA oversold the shuttle. The two central expectations of the program went unmet: the shuttle was neither cheaper nor did it fly more frequently than unmanned space vehicles. In overselling it, NASA also underestimated its true costs and insured not only that the program would run over budget, but that it would be underfunded. But the cost increases had little impact on support for the space shuttle from either Congress or the presidency. Although there were regular battles over funding and attempts to cut the budget, both institutions continued to back budget increases (as observed in Table 1). The ancillary policy existed for its own sake, even when the expectations were not met.

Institutional Conflict

Ancillary policy not only involves immediate political bargains but also is influenced by longstanding institutional conflicts. In a system of separate institutions sharing power through various checks and balances, institutional conflict is business as usual. In order to circumvent institutional conflict, officials in one or more institution must be willing to invest political capital to raise public awareness and break with past practices. But this is unlikely with ancillary policy.

Institutional conflict--within Congress, the presidency, and NASA and among the three organizations--impeded the extent to which space policy generally and the shuttle program specifically could be labeled "national" policy during the Reagan and Bush years. The three organizations may be referred to as plural institutions.[45] A plural institution is a complex set of

specialized units with many hands going off in many directions to handle a multitude of tasks for which the organization has assumed responsibility. It enjoys a life of its own, independent of any person or group of people within the institution. The institution operates with two central features: decentralization and decision ambiguity. This decentralization involves a proliferation of units, many with roughly equal status, each of which has direct input into the final decisions of the organization. There is little top-down control of the offices and their efforts. Decision ambiguity results from the decentralization. It is characterized by decision makers who are unclear about what is going on, what they want, how they will attain it, and who will be involved, yet they make decisions nevertheless. Thus, a plural institution is no small family business. Instead, the interplay of decentralization and ambiguity creates a conglomerate of semi-feudal, loosely allied offices, with considerable independence from each other.

Intra-Institutional Conflict

Within Congress

Congress, known for its decentralization rooted in the committee system, is curiously so when considering NASA. Two authorizing committees handle NASA. In the 1980s the Senate Commerce, Science, and Transportation Committee with its Subcommittee on Science, Technology, and Space matched the House Science, Space, and Technology Committee with two relevant subcommittees: Investigations and Oversight and Space Science and Applications. In addition, the House and Senate Appropriations Committees are keenly involved in space decisions.

Both had subcommittees that handled the funding of Veterans' Affairs, Housing and Urban Development, and Independent Agencies, of which NASA is one.

Congressional decentralization placed NASA in an awkward political position during the development and operation of the shuttle. The space authorizing committees received little respect from and had little power over the appropriations committees. Unlike many authorizing committees which develop informal understandings with their spending committee counterparts that prevent appropriations when there is no authorization, the space authorizing committees failed to reach such agreements with appropriators.[46] In part this was because the authorizing committees were consistently looked upon, in the words of the House committee's ranking Republican member F. James Sensenbrenner, Jr., (R-WI) as "simply rubber-stamp[ing] NASA's wish list without prioritizing."[47] In addition, with only one exception in 1991, the House Science Committee voted on its NASA authorization bill after the House Appropriations Committee had marked up its spending bill.[48] The Senate Commerce Committee acted even later than the House Science Committee, doubly diluting the impact of the authorizing committees.[49]

The delays were partly due to a battle between the House and Senate authorizing committees over whether NASA should receive a multi-year or single year authorization; the former favored by the House committee, the latter by the Senate committee. The result of the battle mattered little in the Senate where for part of the period Ernest F. "Fritz" Hollings (D-SC) chaired the Commerce Committee and was also a senior member on the

Appropriations Committee. Thus, Hollings could exert his influence over the space program through the appropriations process without worrying about his own authorizing committee or its relations with the House committee. Disagreements and standoffs between the two authorizing committees dragged late into the year, year after year.[50] With the cart before the horse, the appropriations committees in both houses largely set shuttle policy through their funding decisions.

In 1989 the House Science Committee chair Robert Roe (D-NJ) did triumph in a funding dispute with the Appropriations Committee chair Jamie Whitten of Mississippi. Yet the incident pointed to the impact of institutional decentralization and the resulting conflict on decision making for ancillary policy. Roe controlled authorization for the Advanced Solid Rocket Motor (ASRM), a new motor that would give added booster thrust for the shuttle to put the space station into orbit. NASA decided to build the ASRM in Yellow Creek, Mississippi, located in Whitten's district and chose Lockheed and Aerojet General as contractors. But before the contractors could secure private funding for the multi-billion dollar project, Congress had to grant authority for the federal government to reimburse the manufacturers should the ASRM project ever be canceled. Roe had to grant this liability authority which Whitten ardently wanted. Even though Whitten initially tried putting the provision in an appropriations bill, he realized it could be knocked out on the floor and so he removed it. Roe then worked out a clever quid pro quo: the Science Committee would approve the liability authority as part of its authorization bill, but the bill would not be moved

through committee until the Appropriations Committee provided funding for the space station.[51] Whitten agreed. Thus, the decentralized committee structure heightened decision ambiguity between the authorizing and the appropriations committees.

Decision ambiguity was further advanced in the peculiar domestic arena within which NASA competed for shuttle funds. This included the departments of Housing and Urban Affairs and Veterans Affairs as well as other independent agencies, the most prominent of which is the Environmental Protection Agency. Thus, the appropriations subcommittees juggled federal spending requests among such strange bedfellows as space activities, low income housing, veterans hospitals, and environmental cleanups. It was never clear in any given year how the appropriations subcommittee would respond to these competing requests. Thus, the funding climate was neither well-suited to NASA's overall policy profile, nor was it well-organized and cohesive in general.

This also meant that several of the principal appropriators during the 97th through 102d Congresses were openly hostile to NASA funding, especially the shuttle. From 1975 until the Republican party gained control of the Senate in 1981, William Proxmire (D-WI) served as the chair of the Senate Appropriations Subcommittee on VA-HUD-Independent Agencies. After the Senate returned to Democratic hands, he reclaimed the chairmanship in 1987 and 1988, when he retired. During these years, Proxmire built a reputation as one of the most vocal critics of manned space ventures. He once bluntly described the Space Shuttle as "about the best example of a wasteful program I can think of.[52]

On the House side, Proxmire's counterpart until 1988 was Edward Boland (D-MA). Boland, his successor Bob Traxler (D-MI), and Bill Green (R-NY), the ranking Republican on the House Appropriations Subcommittee on VA-HUD-Independent Agencies, shared Proxmire's antipathy to big science projects with correspondingly big budgets. While NASA had advocated funding its projects "by the yard," Traxler's metric was smaller. He felt that Congress should fund space projects "a foot at a time, and if all we can afford to put up there is two feet, then that's all we'll put." Traxler clashed with space supporters who believed that with tight budgets his logic would lead eventually to funding an "inch at a time" and soon no funding at all.[53]

Within the Presidency

Although Congress is typically viewed as a decentralized body prone to ambiguous decision making, it is much less common to view the presidency as a plural institution. Instead, people concentrate on the president as a single individual. Yet, the presidency is a plural institution characterized by decentralization among many units in the Executive Office of the President and decision ambiguity as many of these units have overlapping and confusing jurisdiction on a single policy matter. Presidents, especially when they are involved in ancillary policies, rely on these numerous offices to make their decisions for them. The chief executives become involved in the decision process at its end, if at all. Thus, although there is more hierarchy in the White House than on Capitol Hill, presidents do not have (nor do they often wish) to have full control over decisions made on their behalf.

The presidency as a plural institution was apparent in its decisions on the space program during the Reagan and Bush administrations. The decentralization was observed in the several units within the presidency which had jurisdiction over space. The Office of Management and Budget was keenly interested in trimming the shuttle budget. The Office of Science and Technology Policy, headed by the president's science adviser, favored unmanned exploration of space as faster and more efficient than manned flight.[54] The National Security Council attempting to balance civilian and military space priorities, favored the latter. Thus, among three key White House units which had input on the shuttle, one did not like the cost of big science, another liked unmanned big science, and the third liked it best at the Pentagon.

These differences were reflected in a White House staff group, known as the Senior Interagency Group for Space or SIG (Space), appointed by President Reagan in 1983 to coordinate the study of space issues. There was perhaps no better example of the presidency operating as a plural institution than SIG (Space). The eight-person advisory committee included the president's national security adviser as chair and representatives from NASA, the Army, Navy, Air Force, Central Intelligence Agency, the Arms Control and Disarmament Agency, and the Department of Commerce. Officials from OMB and the Office of Science and Technology policy were also observers.[55] Decision ambiguity and bureaucratic infighting were rampant. Although SIG (Space) was specifically charged with investigating the merits of the space station, it also was involved in other issues,

including recommendations on the shuttle in the wake of the Challenger accident. The group, locked in a dispute between NASA and the Pentagon, which wanted a new orbiter, and OMB which wanted to reduce space program costs, took eight months after the shuttle explosion to recommend a replacement orbiter and was unable to agree on a way to fund it.[56]

These disputes within the plural institution of the presidency led Congress in 1986 to call for the creation of a National Space Council to coordinate U.S. space policy. Reagan pocket vetoed the bill to show his opposition to such a council that he felt with tie the president's hands.[57] The 1988 NASA reauthorization bill again called upon the president to create such a council, but this time Reagan did not object.[58]

Within NASA

Finally, NASA itself is a plural institution characterized by decentralization among fifteen field centers across the country, including three manned flight centers, all linked to headquarters in Washington, D.C.[59] The decentralization is further complicated by the geographic dispersion and built-in rivalries among its three manned space flight centers--the Lyndon B. Johnson Space Center in Houston, Texas, the John F. Kennedy Space Center at Cape Canaveral, Florida, and the George C. Marshall Space Flight Center in Huntsville, Alabama. The rivalries were apparent in the shuttle program. Marshall handled the shuttle's components: main engines, external fuel tank, and rocket boosters. Kennedy assembled and launched the shuttle, and Johnson trained the astronauts and was mission control. A researcher on NASA management summed up the competition among the

three space centers: "Each center nourishes a conviction that it is the best of the lot. Each center is hard at work to make its own place strong and secure in whatever lies ahead for NASA. No center is willing to reveal its entire hand to other centers, or for that matter, to Headquarters."[60] As will be discussed in greater detail below, their divided responsibilities created ambiguity and turf fights about who was to do what and exacerbated problems leading up to the Challenger explosion in 1986.

Inter-Institutional Conflict

The most significant inter-institutional conflict affecting NASA existed between the presidency and Congress. Presidents and members of Congress alike often invoke a maxim that the president proposes and Congress disposes policy initiatives. Senator Jake Garn (R-UT) summed up this perspective applied to the space program: "Congress will wait for the president to act. We're 535 members up here--how are we to come up with a policy by ourselves. The initiative has to come from the administration."[61] Often as they wait, members are quick to accuse the president of not setting national priorities. But they are equally quick to step into the void. Even if the president has set his own version of national priorities, Congress often has its own ideas. Congress, especially when it not controlled by the president's party, proposes as often as presidents do.

This created conflict between the two branches revealed by their budget decisions for NASA, shown in Table 6. The disagreements varied by year. There was no disagreement in FY

1985, but fairly significant ones in FY 1991 and FY 1992. The table also makes plain that in the early years of the Reagan administration, Congress acted to restore monies to NASA cut by the White House. By Reagan's second term and continuing into Bush's term, the pattern reversed: Congress was much more likely to cut funds from those requested by the president.

Inter-institutional Cooperation

Congress, although often likely to feud with the presidency, is much less likely to be openly hostile to the bureaucratic agency for which it sets policy. Although these agencies, such as NASA, are commonly denoted as part of the executive branch, the chief executive often has less affinity with them than do members of Congress. A close association among Congressional committees or subcommittees, executive agencies, and interest groups is depicted as a "cozy" or "issue network." For the shuttle program, the network consisted of members of the appropriations and authorizing subcommittees, contractors responsible for the building of the shuttle, and NASA itself. The three points of the triangle were connected by one central factor, resources. Thus, the shuttle's greatest support came from committee members whose states had vested economic interest in its development: Florida, California, and Texas which had tens of thousands of NASA and contractor employees. These interconnections were illustrated when Floridian Don Fuqua, chair of the House Science and Technology Committee and avid NASA backer, resigned from Congress in 1986 to become president of the Aerospace Industries Association of America, an organization representing many aerospace contractors.[62]

Table 6
Presidential and Congressional Funding Decisions
for NASA, Fiscal 1982 - Fiscal 1992

	Presidential Request	House Action	Senate Action	Final Action	Difference*
FY 1982	5.755	6.134	6.214	5.953	.417
FY 1983	6.613	6.807	6.395	6.809	.196
FY 1984	7.107	7.177	7.172	7.178	.071
FY 1985	7.491	7.491	7.491	7.491	0.000
FY 1986	7.928	7.666	7.571	7.656	-.272
FY 1987	7.966	7.650	8.345	10.434	2.468
FY 1988	9.481	9.389	9.100	8.856	-.625
FY 1989	11.488	10.706	10.120	10.676	-.812
FY 1990	13.274	12.263	12.339	12.377	-.897
FY 1991	15.125	14.290	13.451	13.868	-1.257
FY 1992	15.721	13.868	14.305	14.320	-1.401

* Difference between presidential request and final Congressional action Positive number denotes Congressional action exceeds presidential request. negative number denotes Congressional action cuts presidential request.

Source: Various volumes of Congressional Quarterly Almanac and Congressional Quarterly Weekly Report.

The extent of institutional conflict in shuttle decisions, within and across political branches and within NASA makes it difficult for decisions to be made comprehensively. In addition, responsibility for decisions can easily be lost within and across the plural institutions. These conflicts place a premium on incrementalism and compromise. Thus, the policy is likely to continue, but it is not likely to be developed with long range priorities in mind.

Rush to Launch: The Challenger Crisis, 1986

On January 28, 1986, the Space Shuttle Challenger disintegrated shortly after takeoff, killing all seven astronauts on board. The accident was caused by the failure of two synthetic rubber O-ring pressure seals in a joint between segments of the right solid rocket booster. The leak allowed white-hot combustion gases to burn through the joint and ignite the highly combustible liquid-fuel external tank in an explosion. To supporters and opponents alike, it was evident in the months following Challenger that the U.S. shuttle program was in disarray. The explosion grounded the three remaining shuttles, suspended shuttle operations for 32 months, and triggered a fervent debate about the future of the space program. The accident was not simply the "consequence of complex state-of-the-art technologies." It was not just a matter that "sooner or later accidents were bound to happen."[63] NASA knew of the leaking seal joint early enough for the agency to anticipate trouble and respond appropriately. The fact that it did not laid bare the nature of ancillary policy colliding with big science, political expectations created by the high launch rate, and, most

tellingly, institutional conflict within NASA.

Ancillary policy not only affected the choices of the presidency and Congress on the general compass of the shuttle program, but it also shaped how the two institutions viewed the daily operations of the program. For the presidency, its role in monitoring the shuttle program ended once OMB finalized its annual budget recommendations. Beyond this, executive attention to the shuttle program was highly compartmentalized. Presidents Reagan and Bush appointed advisory groups to look into the space program. Yet these panels were charged with examining the broad sweep of the space program or were tangential to the daily business of the White House or both. There was no central White House unit that monitored shuttle operations. Even the Office of Science and Technology Policy was primarily involved at the front end--in proposing what the program should be, not evaluating the program once in place. This meant that the day-to-day operations of the shuttle program was not within White House purview. From the perspective of the White House, NASA was charged with this responsibility.

Congressional authorizing committees, although not especially crucial to funding decisions for NASA, were responsible for oversight of the agency and the shuttle program. Yet because many committee members' constituencies benefitted from jobs through the shuttle program, this oversight was minimal. A GAO official remarked that "The committees have been very supportive of the agency. They have gotten too close to the agency and have been less objective than they should have been."[64] The GAO complained that the authorizing committees

acted as a shield for NASA when presented information on safety and cost mismanagement. According to one Congressional staffer, the oversight committees acted as "cheerleaders" rather than watchdogs.[65] From the perspective of Congress, too, NASA was on its own.

The Politics of Expectations

These daily operations were most significantly affected by the expectation of a high launch rate. NASA concentrated on this expectation as it moved from the development phase to the operational phase of the shuttle program. With completion of the shuttle's test flights in 1982, NASA began to accelerate the shuttle launching schedule, calling for an ambitious two flights per month by 1985. As the Rogers Commission, named by President Reagan to investigate the Challenger explosion, observed, "The greater the annual number of flights, the greater the degree of routinization and economy . . ."[66] This led to, in the Commission's words, "the unrelenting pressure to meet the demands of an accelerating flight schedule."[67]

Yet the Commission concluded that NASA was not adequately prepared to meet the fast schedule. The schedule caused a number of unintended consequences which the agency did not adequately handle, including the compression of training schedules, the lack of spare parts, and an organizational focus on near-term problems rather than long-term planning.[68] For instance, the Rogers Commission observed that in order to keep to the schedule astronauts had less time to train in the flight simulator than was desirable. Moreover, the two flight simulators available for training could support no more than twelve to fifteen flights per

year, well below the twenty-four flights anticipated by the schedule.[69] The increased flight rate also placed great demand for spare parts. The actual inventory of spare parts was on target until the second quarter of FY 1985 when demand began to exceed supply. By FY 1986 when inventories should have been completed, only 65 percent of the parts (32,000 of 50,000 parts) were stocked. These spare parts purchases were deferred in order to meet budget reductions imposed by the Johnson Space Center shuttle management. To obtain needed parts and to maintain the flight schedule, NASA officials resorted to the cannibalization of spares from one orbiter to another. Forty-five out of approximately 300 parts were cannibalized from other orbiters for the ill-fated Challenger flight.[70] Thus, the schedule disrupted the program rather than successfully moving it to an operational level.

The shuttle schedule revealed a stark clash between politics and technology. The accelerated flight rate was set to keep political support for the shuttle program high. There was, however, little thought about how to physically meet the schedule without actually endangering the integrity of individual flights. The Rogers Commission concluded that "The flight rate did not appear to be based on assessment of available resources and capabilities and was not reduced to accommodate the capacity of the work force."[71] The clash between what was expected politically and what could be accomplished technologically raised the threat of safety problems. Ironically, because of the clash there was little incentive to consider safety as a serious concern either within NASA or in the Congressional oversight

committees. As Representative Bill Green (R-NY) said, "there was an assumption of managerial efficiency" with NASA.[72] Yet assumptions about adequate safety were deceiving as senior NASA officials grappled with the shuttle's flawed seal joint and the peril it could cause.

A warning had sounded as early as 1977 when one of NASA's own engineers at Marshall Space Flight Center in Alabama wrote that the primary O-ring might leak and that the secondary O-ring might not seal at all because of joint rotation. Two other memos to senior managers in the Marshall shuttle organization followed, one in 1979 and the other in 1983.[73] In December 1982, the O-rings were designated a "Criticality 1" feature of the Solid Rocket Booster design, denoting "a failure point--without back-up--that could cause a loss of life or vehicle if the component fails."[74] Actual flight data from the Challenger launch in 1984 confirmed that the primary O-ring was susceptible to erosion.[75] A flight in April 1985 showed erosion of the secondary O-ring (meaning that the primary seal had failed). Also in 1985 Morton Thiokol, chief contractor for the shuttle, briefed officials at Marshall about cold temperatures weakening the O-rings.[76] Finally, in 1985 Marshall officials informed NASA headquarters of the joint problem. The House Committee on Science and Technology investigating the explosion concluded that "The O-ring erosion history presented . . . at NASA headquarters in August 1985 was sufficiently detailed to require corrective action prior to the next flight . . . [Yet] none of the participants . . . [from] NASA or Thiokol--recommended that the Shuttle be grounded until the problem with the seals was

solved."[77]

Why then did NASA rush to launch shuttle Challenger? Technological problems of weak O-rings and leaky joints were made worse by problems of institutional conflict within NASA. The conflict was evident in the management of the shuttle's safety program which involved a four-level review process to certify the readiness of all shuttle components. The four-stage process mirrored the shuttle program's overall organizational scheme.[78] Level IV involved contractors who certified the flight readiness of shuttle parts. Level III took place at the Johnson, Kennedy, and Marshall centers which verified launch readiness at each center. Level II, located at the Johnson Space Center, required certification of flight readiness to the manager of the entire shuttle program. Level I was at NASA headquarters in Washington, D.C., which held a "Flight Readiness Review" conference approximately two weeks before a launch.[79] Levels III and IV were responsible for shuttle hardware; levels I and II were managerial and administrative.

Although this hierarchy was the primary channel of communication within the program, it was the key source of communication failure in preparation for the Challenger launch in at least four instances. In 1985, Marshall communicated the seal joint problem to the top level of the shuttle organization but bypassed Level II at Johnson. Yet even with this, the full extent of the seal joint problem was not known at Level I. After the secondary O-ring failed in April 1985, the Marshall Solid Rocket Booster Project manager placed launched constraints on five subsequent shuttle flights, including Challenger in January

1986. These constraints denoted that a problem, unless resolved, could potentially halt the mission. Still on each occasion, the project manager waived the constraints prior to launch. Neither the constraints nor their waiver were known to Levels I and II.[80] In addition, on the eve of the launch, Marshall officials did not inform senior management at either Level II or Level I of the concerns expressed by Morton Thiokol engineers about launching in freezing temperatures.[81] Finally, and perhaps most incredibly, no mention was made of the O-ring problem at any level of the readiness review process for the 1986 Challenger launch.[82] It seemed that bad news travelled neither fast nor up.

NASA's decentralization may have encouraged Marshall shuttle managers to minimize the problem and contain it within the space center. Marshall Space Flight Center was well known for its independence which may have been augmented by its remote location in northern Alabama.[83] "The Marshall guys were not what I would call cooperative with the Johnson guys," remarked a former NASA senior official.[84] There was also a perception that with Level II management at the Johnson Space Center, Johnson was superior to the other two flight centers. "All centers are equal" wrote one commentator, "but Johnson is more equal" than the others.[85] To counterbalance this, Marshall "had its eye on a large piece of the space station" and did not want be blamed for something which would affect shuttle managers' careers.[86]

Competition across the three flight centers also may have helped promote the idea that the joint weakness could be redefined as an acceptable risk. Morton Thiokol developed the rationale of a margin of "safe erosion" or "safe margin of

erosion" in 1984, first on the primary O-ring and then later on the secondary O-ring.[87] Although safe erosion was a seeming contradiction, Marshall managers subsequently adopted the notion on flights beginning in April 1984. Lawrence Mulloy, Marshall's Solid Rocket Booster project manager testified before House Science Committee hearings:

> I think we started down a road where we had a design deficiency. When we recognized that it had design deficiency we did not fix it. Then we continued to fly with it, and rationalized why it was safe, and eventually concluded and convinced ourselves that it was an acceptable risk. That was--when we started down the road, we started down the road to eventually having the inevitable accident.[88]

"The irony, of course," Casamayou wrote, "is that, instead of becoming more alarmed as more flights showed evidence of erosion, the agency became more confident than ever that its predictions were sound."[89] In the words of one Rogers' Commission member, NASA was "playing Russian roulette."[90] As long as the shuttle returned safely, none of these problems seemed daunting.

"Nothing Ends Here"

Within hours after the Challenger's explosion on January 28, 1986, President Reagan vowed that "we'll continue our quest in space. There will be more shuttle flights and more shuttle crews . . . Nothing ends here."[91] The explosion of Challenger carried with it two very different messages about the U.S. space program. It pointed to the vulnerability of the space program which people both within and outside NASA had not fully considered. But at

the same time, because it served as a blow to American greatness in space and technology and because of the overwhelming outpouring of emotion after the explosion, the incident promoted the continuation of the shuttle program and even its enhancement. The problems of O-rings and booster fuel segments were nothing that excellence and renewed commitment could not cure.

Concerns about the vulnerability of the space program led the Rogers Commission to recommend changes to promote the overall safety of the shuttle program and end the pattern of "silent safety" it saw before the tragedy.[92] NASA implemented $2.4 billion in plans that fixed hardware, lowered flight rates, and revamped the four-level shuttle management structure by moving Level II from Johnson to Washington headquarters, thereby centralizing the program and helping to alleviate inter-center rivalries.[93]

Concerns about the future of American greatness in space led Congress to insist on the building of a new shuttle to replace Challenger. It approved the transfer of $2.4 billion from the Department of Defense to NASA to help pay for it.[94] In a display of institutional conflict at several levels, Congress took control of the situation after the dispute among White House officials in SIG (Space) about how the new shuttle should be funded dragged on.[95] The shuttle program started anew in September 1988; the replacement shuttle Endeavour was launched in January 1992, six years after the disintegration of Challenger. Because the contractors knew how to build a shuttle, there was no cost overruns on Endeavour. A 1992 GAO audit reported that of 29 programs initiated between 1977 and 1991 with development costs

over $200 million only the Endeavour and three other projects came in under budget.[96] A more balanced space transportation program also began with the addition of a fleet of expendable launch vehicles. Despite these changes, NASA's own Advisory Committee on the Future of the U.S. Space Program concluded in 1990 that the shuttle program had still not emerged from "developmental status."[97] Ironically, after the shuttle explosion, people inside and outside NASA agreed that the goal of cost effectiveness and commercial competitiveness which NASA, the presidency, and Congress had promoted some twenty years before ought to be abandon.[98] In this is a recognition that shuttle program was not about space, not nationally directed, and not the product of a well-defined policy.

Jobs Today, Jobs Tomorrow: The Space Station, 1984-1992

In 1984, as part of its interest in reinvigorating the space program, the Reagan administration pledged support for the development of a permanently occupied space station. Echoing the lofty appeal made by President Kennedy about putting an American on the Moon, Reagan remarked in his State of the Union message that "America has always been greatest when we dared to be great. We can reach for greatness again. We can follow our dreams to distant stars, living and working in space for peaceful, economic, and scientific gain. Tonight I am directing NASA to develop a permanently manned space station and to do it within a decade."[99] By the end of the year, Congress approved a $150 million down payment for the space station in the FY 1985 NASA budget. The station, which Reagan dubbed Freedom, would be launched in segments via the space shuttle beginning in 1996 and

with permanent occupancy before the end of the century. NASA finally took its "next logical step" for the space program, fifteen years after announcing it.

Like the shuttle, the space station bore the stamp of big science--a grand-scale, long-term technological project. Also like the shuttle, the station was pursued as ancillary policy. The space station was of secondary importance to the presidency and Congress. Despite Reagan's pledge of a reinvigorated space program, administration officials did not see the station as marking the return of the space program as a top national priority. The station was a secondary interest to most members of Congress, although it was a central interest of those who felt their districts would be benefitted by its construction. More fundamentally, the space station was a product of incrementalism, both substantively and budgetarily. The space station could be fashioned as an extension of, if not the logical end point of, the shuttle program. The space station also was attractive because it could be built piece by piece: it could be done by the inch, by the foot, by the yard.

The space station more than the shuttle rested on double-edged budget incrementalism. As with the shuttle, NASA used the incrementalism to convince public officials that they could buy in at a relatively low price, for only a small portion of the project, and stretch out purchases over a very time frame. NASA originally estimated the station costs at between $7-5 to $9 billion. As one NASA official observed, "I reached the scream level at about $9 billion," referring to when he encountered resistance from politicians.[100] So NASA opted for an $8 billion

price that would fit under its growth curve. NASA administrator James Beggs told Congress in 1984, "The space station can be in place within a decade and for about $8 billion."[101] The Reagan administration's initial commitment to the space station of $150 million in FY 1985 was a commitment to spend $8 billion down the road. The "buy-in" numbers also reflected a split between the development and operations phases of the program. The $8 billion was simply for development with no firm cost figures attached to the operations phase of the program. Edwin Meese, one of the station's top supporters in the Reagan administration, summed up the incremental strategy: "Let's get our foot in the water, so that we have a commitment and then we can worry about the long-range costs later."[102] Reports raised questions about the long-range costs because of obstacles the station would encounter once operational. A NASA investigation team found that the station could not be built as designed because a large number of its parts would start to break down before the station was complete. In addition, the report concluded that the station would require 3,800 work-hours of maintenance annually, an increase from an original prediction of 2,200-hour, which itself had upset some members of Congress.[103] But these were not issues that received much attention in the initial space station funding.

Congress and the presidency used the incrementalism to tell NASA that money would be doled out in small allowances. Congress and OMB could also ask for various design changes to meet the exigencies of the budget pictures. In NASA's spending bill for FY 1991, Congress ordered the agency to officially adopt an

"incremental concept" to phase in each portion of the station in a discrete and independent fashion. By then costs for the station between FY 1985 and FY 1991 had reached $5-7 billion (see Table 1). Funding for the station was capped for 90 days until NASA responded with a formal plan.[104] The station's cost through 1999, once $8 billion, was now calculated at $37 billion.[105] For both sides, the space station was just attractive enough to survive, but too expensive to fund fully.

Politics of Expectations

While expectations of cost-effectiveness and fast launch schedules followed the Space Shuttle, the political expectations moving the space station did not involve these economic issues as much as they did jobs. The space station was a good domestic spending project even though it was supposed to be a scientific endeavor miles above the earth. By 1992, the project spawned an estimated 75,000 jobs in 39 states, most in California, Alabama, Texas, and Maryland. Opponents and supporters of the station saw its importance for constituency interests. David Obey (D-WI) stated that "There is no bigger pork item in the domestic budget than this item." Tom DeLay (R-TX) responded: "Can you deprive your state and your constituents of this important source of jobs and revenue."[106] Barbara Mikulski, the chair of the Senate Appropriations subcommittee that handled NASA's budget agreed with DeLay, "I truly believe that in space station Freedom we are going to generate jobs today and jobs tomorrow--jobs today in terms of the actual manufacturing of space station Freedom, but jobs tomorrow because of what we will learn."[107] The public works expectation was matched by the space station's incrementalism.

The hardware of the space station could be developed and produced one piece at a time at various locations across the country. Ultimately, the public works expectation and the incrementalism together suggested the dominant role of Congress relative to the presidency in defining the space station. Although President Reagan had boldly announced his directive to NASA in 1984, the president could ultimately direct much less than the Congress on this space initiative. With the space station, Congress did what it does best--protect local interests, offer constituents jobs, and claim credit for both.

To be sure, the space station also became a lightening rod for criticism regarding the high cost of big government programs in the midst of tight budgets. William Cohen (R-ME) argued, "When we stand on this floor and argue day after day about the size of the budget deficit and then agree to fund programs of this magnitude, then I say there is no hope we will ever bring our budget deficit under control."[108] But the opposition was never adequately organized. It was difficult to get public or groups mobilized against the space program (at 1 percent of the entire budget) as responsible for the deficit. And the scientific community was split on the relative merits of the station.[109]

Like the Space Shuttle, what was missing from the Congressional debate on expectations about the space station was the scientific accomplishments of the project. Thomas Donahue, Chair of the Space Science Board of the National Academy of Sciences raised the issue, "If the decision to build a space station is political and social, we have no problem with that.

But don't call it a scientific program."[110] He stated further, "The Board sees no scientific need for this space station during the next twenty years."[111] The space station became entrenched because of jobs not science.

Institutional Conflict

Within the Presidency

The lack of clear expectations about the role of the space station beyond creating jobs was evident in debates within the White House and Congress. When James Beggs, NASA administrator proposed the space station to the Reagan administration, there was little consensus about its merits. Although most members of the Reagan administration favored a more ambitious space program, they did not necessarily see a space station as part of that ambition. Officials in the Office of Management and Budget, in particular its director David Stockman, argued against the station's excessive cost. The National Security Council opposed the idea because the station did not appear to have any military benefits and, as such, would draw resources away from these priorities. Secretary of Defense Caspar Weinberger felt funds for the space station would drain funds for the shuttle which the Air Force wanted increased. The president's science adviser counseled against it in favor of less costly unmanned missions.[112] In contrast, William Clark, Reagan's early staff chief and White House counselor Edwin Meese and his assistant Craig Fuller favored the station. These viewpoints were reflected in debates within the Senior Interagency Group for Space, the advisory committee Reagan had established to look into the matter in 1983. Reagan allowed the White House group to debate various options

regarding the station and merely entered the process at its end. After months of negotiations and disagreements within the group, Reagan gave the nod to a fully-functional, permanently manned space station. He also fashioned a compromise between OMB and NASA on first year funding for the station at the $150 million level. The plural nature of the presidency and SIG (Space) as a part of it slowed decision making until the president intervened.

Within Congress

Space station policy also rested on conflicts among the appropriations committees, authorizing committees, and the full house. As noted above, the House Science Committee was largely viewed as irrelevant to making decisions on the space program. However, in April 1991, the House panel cut for the first time NASA funding and did so prior to the markup by Appropriations Subcommittee on VA-HUD-Independent Agencies. The Science Committee trimmed the FY 1992 NASA budget by nearly $500 million, although it authorized full funding for the space station.[113] On May 2, the House passed authorization on $15.3 billion for NASA, $2.1 billion of which was for the space station.[114] Yet on May 15, the Appropriations subcommittee called for the elimination of the space station despite the earlier reauthorization bill. Subcommittee chair Bob Traxler asserted that "We simply can no longer afford huge new projects with huge price tags while trying to maintain services that the American people expect to be provided."[115] On June 6, however, rebuking the subcommittee's action, the full house voted to continue funding for the space station by freezing every other space program and cutting public housing money for the poor. Funds were restored after a lobbying

campaign by the White House and NASA which circulated among members a district-by-district breakdown of space station contracts, employment, and money spent.[116]

On the Senate side, there was much less likelihood that funds would be eliminated. Traxler's counterpart, Barbara Mikulski (D-MD), whose state housed several NASA facilities, announced she would fund the station. House and Senate conferees ultimately agreed, allocating $2.03 billion for the station after cuts in other NASA projects.[117] Ancillary policy indicated that the program might be cut, but it was not likely to be abandoned.

Conclusion: Politics Not Science

Pure science and pure politics are two diametrically opposite activities. Decisions in science ultimately imply that there is a proper way to solve a problem. To launch a space station, certain things must be done and certain other things must be avoided. These are difficult issues to compromise. Compromise, however, defines politics. There is no one proper way to solve a problem. In politics, the solution is defined by the number of votes and who has the most influence. Politics overrode science in the U.S. space program during Reagan's and Bush's terms making coherent policy difficult. Scientific questions about shuttle payloads and space station platforms were answered by budget issues, parochial interests of members of Congress, and appeals by American presidents to national greatness.

In 1989, George Bush announced an ambitious Space Exploration Initiative which would return people to the Moon by 2000, establish a lunar base, and, then, using the space station,

reach Mars by 2010. Like Ronald Reagan and John Kennedy before him, Bush called the plan a national priority. Like his two predecessors he sought a decade time line. Bush drew upon recommendations of the National Space Commission which in 1986 had outlined a plan for permanent, self-sustaining outposts in space, including bases on the Moon and Mars and commercial mining of lunar and Martian soil.[118] Its cost was estimated at $700 billion over two decades.

Congress, however, reacted negatively. In votes for FY 1991 NASA funding, the Moon-Mars proposal was virtually zeroed out despite lobbying from Vice President Quayle as the head of the National Space Council. The following year when the Bush administration resubmitted its request for funding only the House Science Committee supported the measure. Although Bush lambasted Congress for not "investing in America's future," members felt that too much money would be spent on a project with too little scientific value.[119] "We're essentially not doing Moon-Mars," Senator Barbara Mikulski bluntly declared.

In its support of the Moon-Mars project, the Bush administration appeared to be offering a plan not just about big science, but about biggest science. Yet it did so with little attention to politics. It attempted to bring the space program full circle back to the early 1960s. It was attempting to recreate space policy as primary policy, which would involve a bold, expensive, and consensual priority. Yet in the political climate of the early 1990s, the boldness and expense of the Moon-Mars plan ensured that it would be anything but consensual. Prevailing ancillary policy directed the course of the space

program and dictate the demise of the Moon-Mars plan.

In February 1993, looking for ways to cut the federal budget and thereby ease the federal deficit, a spokesman for the new Clinton administration announced that the space station would face the budget axe. The same day, the president assured space advocates that he supported the station and would not propose its elimination.[120] In Clinton's position was an odd compromise between politics and science. There was a continued government commitment to the space program (science), but the commitment was limited by tight budgets and other priorities (politics). Ancillary policy continued to direct the politics of space.

Notes

1. "Remarks at Edwards Air Force Base, California, on Completion of the Fourth Mission of the Space Shuttle Columbia," July 4, 1982, Public Papers of the Presidents, Ronald Reagan, 1982 (Washington, DC: Government Printing Office, 1983), p. 892. I would like to thank Roger Launius of the NASA History Office for his gracious help in supplying research materials for this project. My thanks also to Maureen Casamayou for providing me an advance copy of her book and to Diana Rix for her research assistance.

2. Testimony of NASA administrator James Beggs in U.S. Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, NASA Authorization for Fiscal Year 1984, 98th Congress, 1st session, 1983, p. 51.

3. Joseph Trento, Prescription for Disaster (New York: Crown Publishers, 1987), p. 93.

4. "Inaugural Address," Public Papers of the Presidents, Ronald Reagan 1981 (Washington, DC: Government Printing office, 1982), p. 1.

5. America's Next Decades in Space: A Report for the Space Task Group (Washington, DC: NASA, 1969), p. 6.

6. Maureen Casamayou, Bureaucracy in Crisis: Three Mile Island,

The Shuttle Challenger, and Risk Assessment (Boulder, CO: Westview Press, 1993), p. 67.

7. John M. Logsdon, "The Space Shuttle Program: A Policy Failure?" Science, May 30, 1986, p. 1102.

8. "NASA Cut or Delayed Safety Spending," New York Times, April 24, 1986, p. B4.

9. Ibid.

10. Logsdon, "Space Shuttle," p. 1104.

11. Casamayou, Bureaucracy in Crisis, p. 68.

12. U.S. Congress, House Committee on Science and Astronautics, Authorization Hearings before the Committee on Science and Astronautics for NASA FY 1974, 92 Cong., 2d session, p. 17.

13. Ibid.

14. "Building the Shuttle," Washington Post, April 6, 1986, p. A12.

15. Casamayou, Bureaucracy in Crisis, p. 69.

16. Roger E. Bilstein, Orders of Magnitude: A History of NACA and NASA, 1915-1990 (Washington, DC: NASA SP-4406, 1989), p. 58.

17. John Kingdon, Agendas, Alternatives, and Public Policies (Boston: Little, Brown, 1984), p. 15. Kingdon discusses

policies with "high agenda status" which can be contrasted with those of low agenda status.

18. Report of the Advisory Committee on the Future of U.S. Space Programs (Washington, DC: Government Printing Office, 1990), p. 32.

19. Historical Analyses of the Budget of the United States (Washington, DC: Government Printing Office, 1990), Table 4.2, pp. 89-93.

20. David Stockman, The Triumph of Politics (New York: Avon Books, 1986), p. 164.

21. Bilstein, Orders of Magnitude, p. 110, refers to "lean" budgets.

22. "Space Issues Before Congress Involve Setting New Projects, Meeting Foreign Challenge," Congressional Quarterly Weekly Report, July 24, 1982, p. 1766.

23. The average is based on data available for 1984, 1986, 1988-1991 found in The Gallup Poll Monthly (Wilmington, DE: Scholarly Resources, May 1991), p. 39; The Gallup Poll: Public Opinion, 1988 (Wilmington, DE: Scholarly Resources, 1989); The Gallup Report (Wilmington, DE: Scholarly Resources, July 1989), p. 16.

24. The Gallup Monthly Poll, May 1991, p. 38.

25. 25. "Pie in the Sky: Big Science is Ready for Blastoff," Congressional Quarterly Weekly Report, April 28, 1990, p. 1259.

26. The above information found in "Space Program Faces Costly, Clouded Future," Congressional Quarterly Weekly Report, April 5, 1986, p. 732.

27. "NASA Wasted Billion, Federal Audits Disclose," New York Times, April 23, 1986, p. A14.

28. Aeronautics and Space Report of the President, Fiscal Year 1991 Activities (Washington, DC: National Aeronautics and Space Administration, 1992), Appendix C, pp. 173, 178. The appendix records the number of space shuttle flights per year from 1981 to 1991 as follows:

1981--2	1987--0
1982--3	1988--2
1983--4	1989--5
1984--5	1990--6
1985--9	1991--5

1986--1 (before Challenger explosion)

29. Trento, Prescription for Disaster, p. 118.

30. Ibid.

31. "Pie in the Sky," p. 1254.

32. Ibid.

33. "NASA Cut or Delayed Safety Spending," New York Times, April 24, 1986, p. B4.

34. Ibid.

35. Logsdon, "Space Shuttle," p. 1101.

36. "NASA Wasted Billions," p. A14.

37. Ibid.

38. Ibid.

39. Ibid.

40. Ibid., p. A15.

41. Ibid., p. A14.

42. "Space Program Faces Costly, Clouded Future," p. 732.

43. Ibid.

44. "Military Role in Space Program Sparks Concern," Congressional Quarterly Weekly Report, November 29, 1986, p. 2979.

45. For a more detailed analysis of plural institutions, see Lyn Ragsdale, Presidential Politics (Boston: Houghton Mifflin, 1993).

46. "Science Panel Losing Thrust in Drive to Shape NASA,"

Congressional Quarterly Weekly Report, September 29, 1990, p. 3109.

47. "NASA Cuts Slow Ambitious Plans," Congressional Quarterly Almanac 1990 (Washington, DC: Congressional Quarterly, 1991), p. 435.

48. "House Panel Cuts NASA Budget But OKs Space Station Funds," Congressional Quarterly Weekly Report, April 4, 1992, p. 912.

49. "Tiered-Budget Bill for NASA Gets House Panel's OK," Congressional Quarterly Weekly Report, April 4, 1992, p. 876.

50. "Science Panel Losing Thrust in Drive to Shape NASA," Congressional Quarterly Weekly Report, September 29, 1990, p. 3110.

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52. Congressional Quarterly Almanac 1977 (Washington, DC: Congressional Quarterly, 1978), p. 284.

53. "Space Station in Trouble Again After Redesign is Attacked," Congressional Quarterly Weekly Report, March 23, 1991, p. 743.

54. Howard E. McCurdy, The Space Station Decision: Incremental Politics and Technological Choice (Baltimore: Johns Hopkins University Press, 1990), p. 130.

55. Ibid., pp. 139-42.

56. "Space Program Faces Costly, Clouded Future," Congressional Quarterly Weekly Report, April 5, 1986, p. 735.

57. "NASA Authorization," Congressional Quarterly Almanac 1986 (Washington, DC: Congressional Quarterly, 1987), p. 330.

58. "Science/Technology Authorization," Congressional Quarterly Almanac 1987 (Washington, DC: Congressional Quarterly, 1988), p. 24.

59. "NASA Wasted Billions," p. A14.

60. Erasmus Kloman, "NASA: The Vision and the Reality," Report of the National Academy of Public Administration (Washington, DC, April 1986), p. 42.

61. "Space Program Faces Costly, Clouded Future," Congressional Quarterly Weekly Report, April 5, 1986, p. 736.

62. "New Tone Heard in Congressional Dealings with NASA," Congressional Quarterly Weekly Report, June 14, 1986, p. 1325.

63. Casamayou, Bureaucracy in Crisis, p. 3.

64. "NASA Cut or Delayed Safety Spending," p. B4.

65. Casamayou, Bureaucracy in Crisis, p. 62.

66. Report of the Presidential Commission on the Space Shuttle

Challenger Accident (Washington, DC: Government Printing Office, 1986), p. 164, (hereafter cited as Rogers Commission Report). The Commission was named for William P. Rogers, its chair, former secretary of state under President Nixon.

67. Ibid., p. 152.

68. Ibid., p. 164.

69. Ibid., pp. 170-71.

70. Ibid., p. 174.

71. Ibid., p. 171.

72. "NASA Cut or Delayed Safety Spending," p. B4.

73. Rogers Commission Report, Appendix C, pp. 233-43.

74. Ibid., p. 84.

75. Ibid., p. 245.

76. Ibid., p. 136.

77. U.S. Congress, House Committee on Science and Technology, Report of the Committee on Science and Technology: Investigation of the Challenger Accident, H. Report 1016, 99th Cong., 2d sess., October 29, 1986, p. 159.

78. Rogers Commission Report, p. 102.

79. Ibid., pp. 82-83.

80. Ibid., p. 84.

81. Ibid.

82. Ibid., p. 85.

83. Casamayou, Bureaucracy in Crisis, p. 6.

84. "Building the Shuttle," p. A12.

85. Casamayou, Bureaucracy in Crisis, p. 33.

86. "Building the Shuttle," pp. A1, A12.

87. Casamayou, Bureaucracy in Crisis, pp. 41-42.

88. Rogers Commission Report, p. 161.

89. Casamayou, Bureaucracy in Crisis, p. 42.

90. Rogers Commission Report, vol. 2:F-1.

91. "Space Program Faces Costly, Clouded Future," p. 731.

92. Rogers Commission Report, pp. 152, 198-201.

93. Casamayou, Bureaucracy in Crisis, p. 89-91.

94. Congressional Quarterly Almanac 1986 (Washington, DC: Congressional Quarterly, 1987), p. 172.

95. "Space Program Faces Costly, Clouded Future," p. 735.

96. U.S. Congress, General Accounting Office, Report to the Chairman, Subcommittee on Investigations and Oversight, Committee on Science, Space, and Technology, House of Representatives, NASA Program Costs: Space Missions Require Substantially More Funding Than Initially Estimated, December 1992, pp. 3, 10.

97. Future of the U.S. Space Program, p. 32.

98. Ibid., pp. 91-92; "NASA Cut or Delayed Safety Spending," p. B4.

99. "State of the Union Message, January 25, 1984," Public Papers of the Presidents, Ronald Reagan 1984 (Washington, DC: Government Printing Office, 1985), p. 90.

100. McCurdy, Space Station Decision, p. 171.

101. "Pie in the Sky," p. 1259.

102. McCurdy, Space Station Decision, p. 171.

103. "Overhaul Ordered for Space Station Design," Congressional Quarterly Almanac 1990, p. 436.

104. Ibid. Congressional made a similar, although somewhat less stringent, request of NASA for FY 1988. See "HUD, Agencies Get $57 Billion for Fiscal '88," Congressional Quarterly Almanac 1987 (Washington, DC: Congressional Quarterly, 1988), pp. 433-34.

105. "Pie in the Sky," p. 1258.

106. "Freedom Thwarts Funding Foes; But Bigger War Ahead," Congressional Quarterly Weekly Report, May 2, 1992, p. 1157.

107. "Freedom Fighters Win Again: Senate Keeps Space Station," Congressional Quarterly Weekly Report, September 12, 1992, p. 2722. Mikulski replaced Williams Proxmire as chair.

108. Ibid.

109. McCurdy, Space Station Decision, p. 216.

110. Ibid., p. 194.

111. Ibid., p. 215.

112. Ibid., p. 158.

113. "House Panel Cuts NASA Budget But OKs Space Station Funds," Congressional Quarterly Weekly Report, April 13, 1991, p. 912.

114. "Space Station is Questioned as House Passes NASA Bill," Congressional Quarterly Weekly Report, May 4, 1991, p. 1131.

115. "Panel Protects Domestic Funds By Killing Space Station," Congressional Quarterly Weekly Report, May 18, 1991, p. 1289.

116. "House Revives Space Station With Cuts to Housing," Congressional Quarterly Weekly Report, June 8, 1991, p. 1492.

117. "Mikulski Trims Carefully To Pay Cost of Freedom," Congressional Quarterly Weekly Report, July 13, 1991, p. 1890.

118. "Space Program Faces Costly, Clouded Future," p. 733.

119. "Bush Goes on the Counterattack Against Mars Mission Critics," Congressional Quarterly Weekly Report, June 23, 1990, p. 1958.

120. "Clinton May Not Fight Cuts To Space Station, Atom Smasher," Arizona Daily Star, February 26, 1993, p. A4.

Chapter 6

Presidential Leadership and International Aspects of the Space Program

by

Robert H. Ferrell

The American space program--so wonderful an enterprise, in many ways so successful--was dominated at the outset by the president's concern with international rivalry and world prestige, and to a large extent international concerns have remained a powerful shaper of the U.S. civil space program. It is in this area that the president has traditionally been the key actor, shaping foreign policy objectives without great involvement by the legislative branch. If an "imperial presidency" has ever existed, it has been in the definition and execution of foreign policy objectives. Foreign policy considerations have shaped what has obviously been a U.S. domestic science and engineering program. This clearly seen in NASA's principal human spaceflight projects from its organization until the present day--the Apollo mission, the Space Shuttle, and the space station--and in any accounting of NASA's history the international aspects of these programs must loom large. These programs consumed the bulk of NASA's budget and for a long time occupied the energies of most of NASA's employees and contracting companies. The three major projects lay at the front of international relations, beginning with the intense rivalry of

the U.S. and U.S.S.R. over sending a human being to the Moon.

During the years of the Space Shuttle's development, from the 1970s into the mid-1980s, the competition lessened, for after the Americans bested their Soviet competitors in the Moon race the Soviet Union appears not to have participated in any serious race for a shuttle, preferring expendable rocket boosters for space tasks. Nonetheless, international considerations did not lessen. Space shuttle policy was driven considerably by rivalry with emerging European interests in science and technology and consolidation of the continental economy. When it came to constructing and supplying a space station, the principal destination for the American shuttle, the U.S. chose to emphasize cooperation with its allies--the European Space Agency, Canada, and Japan--in building a permanently occupied and large space station Freedom. The Soviets opted for small and occasionally tended throwaway stations served by expendable spacecraft ferrying occupants between earth and the station. By the middle part of the 1980s, however, competition had dropped to a low ebb, and ceased altogether with the collapse of the U.S.S.R. in 1989. Interestingly, when budgetary as well as technological troubles afflicted the Freedom space station the prospect arose, mirabile dictu, of cooperating with the Soviet Union's successor organization, the Commonwealth of Independent States, through use of its latest Mir station and, in place of increasingly expensive U.S. shuttle flights, the gigantic rocket named Energiya.

But international competition has not been the sole driving

force in the U.S. space effort, and presidential leadership of it. Sometimes the successes of a program turn out to be more than the founders envisioned, and such is the case with NASA. In the passage of years into the twenty-first century the international use of satellites for telephones and for television and for guidance of ships at sea and for weather observation and for managing the earth's natural resources has made a large difference in the shape of world affairs, in bringing nations together.

International Rivalry

In the beginning was rivalry, which Americans now understand much better than they once did, for it is now clear that the Soviet Union took its position on space out of weakness. From the beginning the Soviets were behind in almost every kind of technologically complicated armament. It was the Americans who constructed the first nuclear weapon. When the Soviets exploded their test device in 1949 it was, as we recently have been told, a copy of the American bomb, secured through the agency of the German-born, British-naturalized Klaus Fuchs. The Americans managed a hugh hydrogen device in 1952 and miniaturized it in 1954. The Soviets did not detonate a thermonuclear device until 1955.[1] But Russian weakness always was there, a weakness born of the very nature of the system with its dictatorial ways, which introduced into Soviet science an element of rigidity and lack of argument, hence imagination. The weakness also resided in the economic backwardness of the Soviet Union, in this respect a

third world country, as visitors have so often noticed. For whatever reason, when the American H-bomb was tested at Bikini the United States was clearly in the lead, and in subsequent weapons races the results always were what Herbert York announced years afterward, a lead time for the U.S. over the U.S.S.R. of between four and six years.[2]

Soviet weakness led to the covering up and a denial of access to most parts of the country that had marked all of the Stalinist period, and on the American side it produced a series of efforts to find out what the Soviets were doing. This led straight into the Sputnik launching, proceeded directly from it to the launching of the first reconnaissance satellite by the U.S. early in 1961, and in turn inspiring the Soviets to other space endeavors. The moves and countermoves did not all fit together neatly, but the Soviet accomplishments brought the Americans into a full-scale, open race for the Moon.

Still, what were the Americans to do? Even today, after the Cold War has passed into history--after the Soviet collapse should have inspired more calm appraisals of events of the last two generations--it is not well known among American historians that for the first fifteen years of the post-World War II era American intelligence of Soviet missile strength was dangerously poor. Initially the U.S. used the myriad aerial maps of Russia made by the Luftwaffe. As a small-fry member of the U.S. Army Air Forces, I remember a building in northern France full of German maps, fascinating because of their detail, also because

they had been printed on some sort of oilcloth--they would have made exciting dinner-table covers. These maps quickly went out of date, and American intelligence officers interrogated the millions of German prisoners who poured back into West Germany. Eventually, the stream of returnees dried up and the next venture was to overfly Soviet borders photographing obliquely. The Russians discouraged these enterprises by shooting down a plane now and then.

This was the background that led President Dwight D. Eisenhower's administration to welcome the International Geophysical Year (July 1957-December 1958) in which both the U.S. and the U.S.S.R. announced they would put up satellites. On the Soviet side the task promised to be easy, because the Soviets possessed large-thrust missiles. They were crude missiles, powered by clusters of small engines. On the American side matters promised to be more difficult, because by this time the U.S. had abandoned huge boosters. After miniaturization of the H-bomb and the Bikini test, they no longer seemed necessary. This meant that any American satellite would have to be very small and require miniaturization of a complex sort. President Eisenhower also required that the American effort be civilian, not military. The U.S. Army probably had the capacity to send up a satellite as early as the autumn of 1956, but the president refused permission for a military launch.

It is unnecessary to go into the well-known American effort in the mid-1950s to open up the Soviet Union. Walter A.

McDougall and others have set out the calculations by which Eisenhower tried to get the Soviets to reveal what he felt was their weakness but could not be sure.[3] The "open skies" proposal at the Geneva Summit Conference in 1955 was part of the strategy. "We knew the Soviets wouldn't accept it," he later said in an interview, "but we took a look and thought it was a good move."[4] When it failed the president permitted an extraordinary venture with 516 large weather balloons carrying gondolas, the latter containing automatic cameras and radio beacons that allowed tracking, releasing them in Western Europe to float over the Soviet Union, to be captured by plane after they neared Japan and Alaska.[5] When its results were modest he resorted to the U-2 reconnaissance aircraft.

Meanwhile Eisenhower had hoped to send over scientific satellites during the I.G.Y. that would establish a precedent for military satellites; after the Russians presumably raised no objection to scientific satellites the real thing would follow.[6] The Eisenhower administration agonized over how to avoid violating international law and yet get military satellites over the Soviet Union. One suggestion was to send them first into orbit over the friendly political skies above the equator, and then send them north. The Soviets solved this dilemma by lofting Sputnik and not even mentioning the legal tangle, later justifying their action by asserting the right of vertical freedom of space and, as for the horizontal, claiming that their satellites did not fly over countries below but the countries

themselves rotated under the Sputnik.[7]

After the Sputnik crisis a cornucopeia of Cold War confusions emerged. At the outset there was consternation in the U.S. that "the Russians are ahead!" People counted engineers, of which the Soviet Union possessed hundreds of thousands. American college and university administrators jumped on the Sputnik bandwagon, securing the National Defense Education Act, a thinly disguised piece of legislation that brought all sorts of studies under federal subscription. I remember my personal confusion one day to find that a close friend, a folklorist, had obtained a series of fellowships for his graduate students under the N.D.E.A. On the national scene Eisenhower sought to quiet the uproar, only to find his words lost in the public melee. The Democratic party mercilously berated the nation's oldest president, unconcerned that Eisenhower's health was parlous--a heart attack in 1955 (probably two of them before, in 1949 and 1953), Crohn's Disease in 1956, a stroke in 1957. The most opportunistic American political leader in many a year, Senator Lyndon B. Johnson, took the advice of George Reedy and began to use Sputnik to gain the White House, but he was forestalled for a short time by another Democratic politician who managed to speak more convincingly of a "missile gap" and like Johnson made little effort to find evidence to the contrary.[8]

All the while Nikita S. Khrushchev was producing one of the more remarkable international shell games in the history of the twentieth century. As in the case of Communist China during this

era, of which critics said that China was weak but Mao was strong, so with Russia and Khrushchev, although in no sense either so obviously or so completely. He took his opportunity out of the series of American intelligence efforts to penetrate Soviet secrecy, knowing he could get away with a fair-sized bit of lying. His assertions constantly kept the Americans off guard. During the Suez Crisis of 1956 the Soviet Union threatened the Western allies through graduated messages to their leaders, scaring the weak French government by referring to a possible deluge of intermediate-range rockets, telling the wavering British government that only a few warheads could remove the British Isles, informing the American government with studied innocence that both the U.S. and U.S.S.R. possessed nuclear warheads and the means to deliver them. In one of his Kremlin tirades he avowed that his country possessed missiles of such accuracy they could hit a fly in outer space. With these pleasantries, which rained down upon the governments of Western Europe and especially upon Washington from 1956 until his disappearance from the international and national scene in 1964 (under claim of "adventurism" by his successors), the Soviet premier did not hesitate to accompany his space bluff by producing crises in Berlin and Cuba, not to mention stirring up third-world countries everywhere.

This, then, was the milieu in which after the special challenge of Sputnik, and of Lunik in 1959 (sending an unmanned spacecraft straight into the Moon), came the flight of Yuri

Gagarin in April 1961, shortly after Kennedy's inauguration and shortly before the Bay of Pigs affair, which twin humiliations almost certainly brought the Moon race. The manner in which Americans accepted Khrushchev's exaggerations--failed to sense that if the Soviet Union was ahead in some space exploration the space race as a whole had hardly been decided--was extraordinary, although of a piece with such previous American effervescences as the fear of native Americans, the Palmer raids after World War I, and McCarthyism. This became evident when on February 20, 1962, John Glenn spent five hours in space. The resultant enthusiasm of his fellow citizens from Ohio sent him to the Senate, when he seems likely to remain until the year 2000 or later.

The Race to the Moon

Many books and articles have described the Moon race in all its particulars and massive achievement.[9] Even now, the photographs taken by the spacecraft, as men and machines came ever closer, not to mention the first landing and its subsequent five missions to the surface, are of absorbing interest. The books and articles describe how the grand enterprise began in 1958 when landings began to be talked about with the transition from NASA's predecessor organization, the National Advisory Committee for Aeronautics, and took a giant step forward with the Kennedy formal decision in 1961. The race to beat the Russians to the Moon required eleven years. It consumed the attention of everyone in NASA--at peak employment 36,000 people in civil service jobs, 400,000 hired by contractors. The agency delayed

all other programs, and general space sciences had a modest budget.[10]

At the outset the cost was anyone's guess. Critics were claiming $100 billion. NASA administrators made no effort to guess low, and the last director of NACA, who was NASA's first deputy administrator, Hugh L. Dryden, estimated a cost as high as $40 billion. Shortly after Gagarin's flight, Robert C. Seamans, Jr., estimated that it would cost between $20 to $40 billion. They eventually settled on this figure of $20-40 billion, and to hold to it they demanded flexibility and adherence to their own timetable. In congressional hearings they pointed out that each year of delay would cost $1 billion. In the end the project suffered a three-year delay, half of it because of the 1967 accident in which three astronauts lost their lives on the launching pad; the delay cost $3 billion, making a project total (up to the time of the first Moon landing, excluding the subsequent five landings) of $23 billion.[11]

During the Apollo program there never was any question of cooperation with the Russians, save occasional talk including a curious speech by President John F. Kennedy before the United Nations in September 1963, in which the president remarked to no one in particular, "Let us do the big things together." It elicited no response from the other side, save dismissals by a few Soviet editors who pronounced it "premature."

For different reasons there was no American effort worthy of the name to bring the western Europeans or Japanese into the

project. NASA's first administrator, T. Keith Glennan, told the hardheaded director of NASA's international relations, Arnold W. Frutkin, that "International cooperation might, in the end, make more sense than any other aspect of the program." As Frutkin remembered, Glennan "said it in just so many words."[12] But in truth there was not much Frutkin could do with an international program beyond arranging for tracking stations and otherwise bringing in foreign technicians and students for American university training. Apollo had to be an American show; the technology abroad was not good enough to use and the international rivalry at its heart required a U.S. demonstration project. In the only two European countries with serious space projects, France and Britain, very special conditions obtained. The French government under President Charles de Gaulle was trying to exert its own and Europe's independence of the United States, and it was impossible for Washington to cooperate with Paris without proliferation and competition, with some of the so-called "dirty interfacing" (revelations of American technology) going off in the direction of the Soviet Union. As for the British, when Sputnik went up they threw in the towel and canceled their intermediate-range missile project, the Blue Streak, in hope the U.S. would give them a similar missile, which they needed to extend the life of their aging V-bombers. When the Kennedy administration's Defense Department under Robert S. McNamara canceled the substitute missile program, Prime Minister Harold Macmillan arranged with his American opposite to obtain

Polaris missiles for Britain's nuclear submarines. This diplomacy diverted any British interest in the Apollo project.

For such reasons the Moon race was an American affair, and in a notable debate in the House of Representatives shortly before the triumph of Apollo the point of view became apparent.[13] Some of the oratory owed to the custom of Congress wherein an inflation of words sounds good to the folks back home. Some of it derived from the excesses of the speakers. In this regard Richard L. Roudebush (R-IN) set the tone. He offered an amendment to NASA's authorization act in 1969, requiring the implanting on the surface of the Moon of the American flag and none other. A similar amendment had disappeared in committee because it implied that the United States was about to establish sovereignty, that is, ownership of the Moon. That would have violated the Outer Space Treaty of 1967. Roudebush altered his own amendment to show that implanting the flag was "intended as a symbolic gesture of national pride in achievement and is not to be construed as a declaration of national appropriation of claim of sovereignty." The Indiana legislator spoke with Hoosier eloquence:

> Over $23 billion in hard-earned taxpayers' money will have been spent to carry out this formidable task. In all due fairness to the American taxpayer, it does not seem too much to ask that our flag--Old Glory--be left on the lunar surface as a symbol of U.S. preeminence in space to which the citizens of this Nation can refer with pride . . .

> History and national pride dictate that our achievements be duly commemorated. I know of no act more significant nor symbolic that would memorialize our achievements than the erection of the "Stars and Stripes" on the surface of the Moon.

The Soviets, Congressman James G. Fulton (R-PA) pointed out, "recently sent the coat of arms as well as a picture of Lenin to the surface of Venus." Congressman James Symington (D-MO) countered that the president through NASA should direct what flags or symbols should be placed on the Moon; depositing Russian symbols on Venus was a bad idea because I do not recall that this occasioned the general approbation of mankind.

> Nor did I realize we were accepting lessons from that particular source in how to win the hearts and minds of men. . . . Jefferson wanted us to maintain "a decent respect for the opinions of mankind." What "respect" does this graceless edict demonstrate for the opinions of nations which produced Galileo, Copernicus, Newton, Einstein, Tsiolkovsky, and other giants in thought and deed? What star or stripe is tarnished on Old Glory by a simple gesture honoring the whole history of man, his collective dream, and his epic persistence without which our own continent might yet be undiscovered?

Other congressmen pointed out that the flag was already on the Moon by being painted on the Surveyor spacecraft. Hence another flag would not hurt anything. Allard Lowenstein (D-NY) thought

the president should make the patriotic choice.

To all this point-making Roudebush was oblivious. "I feel compelled," he announced, "to offer-this amendment in view of the many proposals being put forth which advocate that our spacecraft carry to the surface of the Moon the United Nations flag, the flags of other nations, or other emblems or articles symbolic of international cooperation in space exploration." On a voice vote the Roudebush amendment carried, with an overwhelming chorus of "ayes."

Some years later, perhaps because of the troublesome end of the Vietnam War, with patriotism worn a bit thin, and as a contribution to detente, the United States and the Soviet Union agreed to conduct a joint space flight, known as the Apollo-Soyuz Test Project, in which a three-man Apollo crew docked with a two-man Soyuz crew. The U.S.S.R. agreed to a few modifications of the Soyuz spacecraft to permit docking, and conducted a test flight in 1974. Both countries launched spacecraft on July 15, 1975, the two ships docked on July 17, exchanged visits and joint experiments, and undocked July 19, with Soyuz returning to earth two days later, Apollo three days thereafter. Because the experiment marked the last flight of the Apollo spacecraft, the androgenous docking adaptor became obsolete at the end of the mission.[14]

In the short term the Apollo project was an American triumph. In the long term the U.S. had found itself in serious rivalry with an opponent about which it knew little, and the

cost, $23 billion, was large and might have made a difference in President Johnson's "Great Society" program, or helped avoid the inflation that fueled dissatisfaction with the Vietnam War. On the American side, and another minus, it is possible to contend that the Moon race led straight into defeat in Vietnam. When rivalry with Russia turned technological it combined with other factors to confuse the U.S. officer corps, making them think that technology would win any sort of war, such as the conflict in Vietnam. The Kennedy administration, to be sure, talked a great deal about winning the hearts and minds of the people, of counter-insurgency. The generals and colonels often thought in terms of winning with technology. To return to the space problem, on the Soviet side Sputnik and its aftermath, the Moon race of the 1960s, created a technological race that the Soviet Union could not win. The line from 1957 to the collapse in 1989 is clear.

The large admixture of bluff in Soviet policy under Khrushchev may have delayed the coming of real detente by ten or twenty years. Khrushchev's bluff with Sputnik was caught by the first American spy satellite in 1961. The United States announced the fact, throwing the truth in Khrushchev's face. Interestingly, the ultimate American technological confrontation with the Soviets, the Strategic Defense Initiative, was not meant to be a bluff. President Ronald Reagan was a believer. Yet the scientific impossibility of the program made it a bluff. In that sense the Americans borrowed, with enormous success, from the

lexicon of the Soviets.

International Relations and the Space Shuttle

After Apollo, the great American space triumph in the Cold War, NASA turned to the second of what proved to be three large projects, construction of a Space Shuttle, sometimes known as the Space Transportation System (STS). Given that Apollo was a project for humans in space, not machines, it was only to be expected that the shuttle, sponsored by President Richard M. Nixon in 1972, looked in the same direction. As happened with Apollo, so with the shuttle: scientists by and large did not favor it, believing that instrumented packages could do just as well, be cheaper, and not run the mortal risk of failure. But the "man in the Moon" dream captured Americans and Soviets alike, and after Apollo continued to hold attention, with the result that the space choices seemed to be the shuttle and after it a space station, with the possibility of more distant space shots, and a "grand tour" of the planets a distinctly third choice. With money tight because of Vietnam and the Great Society programs, NASA began with the shuttle.[15]

NASA's decision for the shuttle defined what was to be the principal international component of the project, what became known as Spacelab. From the beginning Spacelab was an international project. It took its origin out of an understandable NASA effort to involve West Europeans in a project that would have a clean interface, not revealing American technology that might pass to the Soviets. This meant a module,

in a sense a can that would fit within another can, the shuttle. Among its attractions was that until NASA could obtain appropriations for a space station the shuttle needed some kind of purpose apart from transport of satellites. When shuttle costs inevitably began to escalate it would be clear that rockets could carry up satellites much more cheaply than the vaunted STS. NASA needed Spacelab as a primary purpose for STS until the shuttles could turn themselves into freighters for the space station.[16]

Persuading the Europeans to create a justification for the shuttle by constructing a "research and applications module" was fairly easy, for they too needed to gain time for a space project of their own. With the approaching quincentennial of Columbus it evidently occurred to Europeans that the shuttle module could be the precursor of a several-module European space station that could bear the historic name of Columbus and restore Europe to the primacy it had lost centuries before after a tricky Genoese did some fast talking with two simple-minded Spanish monarchs. In the event, one should add, the Columbus scheme never came to pass, because to pay for it including a proposed European shuttle known as Hermes (why not Amerigo Vespucci?) would have cost $15 billion--$6 billion for Columbus and $9 billion for Hermes. The abortive project would truly have required Queen Isabella's crown jewels.

The Americans for a while had to deal with the predecessor organizations of what in 1975 became the European Space Agency,

known as the European Scientific Research Organization, for spacecraft, and the European Launcher Development Organization, for launchers. Unfortunately these organizations happened to be of questionable competence. ELDO, for example, was trying to build a three-stage booster, each developed in a different country, a sure-fire prescription for failure. Coupled with this disorganization was the European way of doing things. On one occasion an American member of a team dealing with Italian scientists at Turin proposed a working lunch of sandwiches. As he wrote later, the Aeritalia team leader, Professor Vallerani, reacted first with shock, then dismay, finally disbelief. The professor noted several times that "it could be done, it would just take one phone call, was that really what we wanted to do?" Finally the professor exploded with: "Yes, it can be done--but it's never been done!" The visitors accepted plans for a modest lunch of five courses.[17] But all was well that ended that way. When ESRO AND ELDO reorganized into ESA, things moved faster, and Spacelab was duly constructed and scheduled for the American shuttle.

Despite the awkwardness of cooperation it seemed worth the effort. Hans Mark, NASA deputy administrator in the early 1980s, flew over to Europe with the Boeing 747 carrying the test shuttle Enterprise and discovered the excitement of Europeans over what the American space program was about to do. The 747 pilot overflew London and received permission from the Heathrow tower to fly down the Thames at three thousand feet. The result, as

Mark described it, was

> absolutely fascinating. It was Sunday afternoon and many thousands of people were lining the river watching for the Enterprise to pass overhead. The crowds were enthusiastic--even at that altitude we could see them cheering and waving. Then, in the course of three minutes, we flew over the Parliament at Westminster, the Tower, and the famous observatory at Greenwich.

Nor was that the end, for the landing at Stansted was "completely overwhelming." People held their hands up making the "V" for victory sign, and many were in tears. "I cannot explain why this happened, I can only record it." The Enterprise was the star attraction at the Paris Air Show. On return it stopped in Ottawa, the Canadian capital, population three hundred thousand, and four hundred thousand people turned out to see it.[18]

Several years later everyone again had discovered the hugh costs of venturing into space. The Americans could remember the $23 billion-plus cost of Apollo and now found that just to enter the test phase the shuttle cost $5.15 billion, with only two shuttles purchased out of a fleet of five, not to mention launch costs. The Europeans were shocked by the unending requirements of Spacelab for documentation, interfacing, and testing. By 1982 the cost of Spacelab was up from $250 million to $1 billion.

Then came two more shocks for the Europeans. First NASA in a budget bind canceled a U.S. spacecraft that was part of a two-spacecraft International Solar Polar Mission to observe both

poles of the sun. NASA had enlisted the Europeans in the project and canceled with little more notice than a phone call, with the Europeans holding the bag.[19] Then NASA officials had airily given ESA officials the notion that they would bail out the cost of Spacelab by buying a half-dozen copies, and NASA only bought one unit at a cost of $128 million.

As if these experiences in international cooperation were not enough, flight charges on the shuttle turned out to be far higher than expected, advancing from $10 million to $300 million, so that ESA could not afford to send up its own module. The U.S. paid for the first flight, the Germans for others. The Europeans complained they could not even afford to pay for experiments on flights. The cost of shuttle flights created an impossible situation, which NASA officials could not explain away. ESA accused NASA of bringing all its bureaucratic overhead at Kennedy Space Center into its charges, which may have been true. "We tried to explain to them that we had developed the Space Shuttle, and yet users in the U.S. government paid the same price that was charged to ESA," wrote Douglas R. Lord. "Somehow this argument was never accepted by our European friends."[20]

Suffice it to say concerning international participation in the shuttle that only one project proved satisfactory and that was Canadarm, the $100-million remote-controlled crane carried in the shuttle, used to manage satellites. It amounted to a deal with Canada, whereby America's northern neighbor obtained all the tickets for shuttle flights it wanted. The Canadians were happy,

and so was NASA, which received a free crane, and the interfaces were just as clean as those for Spacelab.[21]

For the rest, the space shuttle had little to do with international relations other than carrying international passengers, which scientifically was no more of an achievement than, say, the Soviet stunt with Sputnik in 1957, and much less interesting internationally. In 1983, with the first Spacelab mission, the shuttle took up a West German, for West Germany had footed most of the cost of Spacelab. He was followed by Canadians, assorted Europeans, a Japanese, and a Saudi prince.

Space Station Freedom

The next major project of the American space program, the space station, was to have more of an international component that Spacelab, and considerably more financial involvement. Because of a series of confusions over planning for the space station it was to raise more questions about cooperation. And after breakup of the Soviet Union it presented fascinating possibilities for C.I.S.-American collaboration.

When a new NASA management team took over in 1981, Administrator James M. Beggs and his deputy Hans Mark, announced at their confirmation hearings that their top priority was to be the space station, and from that moment onward it was presumed that the station would possess a large international component. The reasoning was necessarily devious. For one thing, there was a strong streak of international idealism among the American people; after the public indifference that had plagued

development of the shuttle, NASA needed all the support it could muster. And then there was the ever-present money problem. From the beginning of the shuttle project the space station had been on "hold" because of the money problem. It was impossible to propose the station and the shuttle at the same time, because there was not enough money, so the shuttle came first. That made the shuttle a little embarrassing, for it needed a place to go. Spacelab was not enough of a place. The shuttle could not be a box car for satellites, for a rocket could do that job much more cheaply. As soon as possible NASA administrators had to advocate the space station, get the box car problem out of sight. But then the money problem raised its ugly head again. In 1981 no one spoke of the possible cost of the space station because no one really knew. That was where the international side of the station came in. If cost was indeterminate but large, it would be better to spread the cost abroad.

Also, what better way to forestall competitive European and Asian programs than co-opt them by the device of cooperation with the American space program?

There was yet another reason for bringing in the foreigners. As Captain Robert Freitag, an original space station advocate, who could be counted on to describe the issue with style, recalled: "We knew that if we found ourselves locking in with international agreements, it would be awfully hard to say no to the program."[22]

To give them credit, the administrators of NASA were not

entirely cynical about international participation. During the 1970s they had seen how the primitive technological accomplishments of Western Europe and Japan had given way to prowess that was close to the abilities of the world's premier technological power. Whatever the concern about interfaces that had marked the shuttle program, they knew that sooner or later the Europeans and Japanese would catch up. The world was coming together, whatever nations did to prevent it. They might as well embrace international cooperation because they would be forced into it anyway. And, lastly, they were all adults of the 1940s and thereafter and knew that the old isolationist days of the 1920s and 1930s were gone forever. The Hitler government in Germany had been defeated only by an Allied coalition.

Cooperation, once undertaken, had its momentary dangers, for within the United States the 1980s were the era of Reaganite conservatism and the administrators had to take care against any claim of "dirty interfaces." A group known as the Space Station Technology Steering Committee scheduled a meeting at Williamsburg, Virginia, in March 1983, where there was to be talk of "recommended advanced technologies." A pro forma invitation was issued for foreign participants. NASA higherups withdrew the invitation, worrying that it might lead to "a massive hemorrhage of U.S. technology."[23] By mid-1983 it became evident that the potential of the station for international involvement would not sell it in Congress, and Beggs and such lieutenants as Kenneth S. Pedersen and Margaret Finarelli backpedaled on international

cooperation, not trying to get away from it but not stressing it as a selling point. To Congress they offered the space station, by this time christened Freedom, as a modern-day Fourth of July.[24]

Another momentary awkwardness was the sudden hostility of the American military establishment, in the person of Defense Secretary Caspar M. Weinberger. The secretary said his department wanted nothing to do with Freedom, which was deeply embarrassing because the military was being counted on to pay for many shuttle flights. The good side of this disappointment was that NASA, which had been courting the military, could now avoid it and please the West Europeans and Japanese who would find a strictly civil program more appealing. NASA decided, in Beggs' words, to ask the president to approve "a completely civil station." ("Keep in the idea of international participation," he added, albeit to members of his space station task force.)[25]

All the while it was necessary to pooh-pooh the refrain of the large body of scientists who said that everything a space station could do, a shuttle with a lab module could do better. Freedom's chief scientist, Robert W. Phillips, avowed this was not so; he said it, one should add, in 1992, but echoed the explanations of a decade before. "The plant people can't wait to do a seed-to-seed experiment," he said. "You can't do that in a week." Same thing for animals. "Every organism I know has been changed in space." Not to mention the advantage of forming materials under conditions where separation in a mixture is no

longer based on density."[26]

Lastly, in making the space station attractive NASA authorities estimated its cost at an absurdly low figure, $8 billion. The reason, the director of NASA's space station task force, John Hodge, recalled, was that "I reached the scream level at about $9 billion."[27] They omitted a few small things, such as the cost of transporting the station from earth to orbit, operating it once in orbit, and conducting the experiments with seeds, rats, and crystals. They put in an impossibly small reserve for changes, and limited spending for ground support. They said nothing about a "lifeboat" to get the crew back to earth if the station became something less than a station. These things out of the way, Beggs ingeniously announced that the president could purchase space station Freedom "by the yard," buying and sending up a piece, presumably, when the mood inspired him.

All this set the stage for President Reagan's announcement of the station. The president decided to support the station early in December 1983. The decision as to its international proportions seems not to have been his, except in a formal sense. In a meeting at the White House on January 18, 1984, with the president not present, an ad hoc group that included Administrator Beggs decided to place the space station and its international participation in the state-of-the-union address scheduled for exactly one week later. At which point the president's "speechwriting office," according to John M. Logsdon,

got in touch with NASA to fit in the appropriate words. On January 25 the president informed Congress and the nation that "tonight, I am directing NASA to develop a permanently manned space station and to do it within the decade." A little later in the speech he included the international words. On January 25 the president informed Congress and the nation that "tonight, I am directing NASA to develop a permanently manned space station and to do it within the decade." A little later in the speech he included the international words: "We want our friends to help us meet these challenges and share in their benefits. NASA will invite other countries to participate so we can strengthen peace, build prosperity, and expand freedom for all who share our goals."[28]

The White House group of January 18 decided that Beggs would carry the presidential invitation to the foreign governments, and the administrator did so, like a global traveling salesman, aboard a White House plane. An economic summit meeting in London was in prospect for June 1984, and a group of sub-officials known as the "summit Sherpas" arranged for their principals to declare at the meeting that they "agree in principle to cooperate in the development of an international Space Station, demonstrating that free nations will continue to use outer space for peaceful purposes and for the benefit of mankind."[29] The summit leaders met, and with the key words spoken strolled out of the meeting room only to encounter, on a table, a model of the proposed space station. Photographers captured the moment, with President Reagan

standing in front of the model, arm extended, explaining the station, Prime Minister Margaret Thatcher standing next to him looking closely at the model, and Prime Minister Yasuhiro Nakasone on the other side of the table looking on politely, lips pursed.

In working out international cooperation on the space station over the following years the large enterprise was made much easier by the piecemeal approach Beggs had mentioned to President Reagan. Whatever the eventual appearance of space station Freedom, it seemingly was like one of the children's games of generation or two ago: "it was a celestial Tinkertoy, its modules and solar panels and other components fitting together any way the U.S. and the cooperating nations decided." Because of experience with Spacelab the West Europeans in ESA chose to contribute a service module. The Canadians because of experience with the shuttle's Canadarm proposed a bigger arm, a Mobile Service System.

In the latter 1980s the several projects seemed to be going along well, admittedly with a few problems, as perhaps one might have expected. One of the awkwardnesses was money. The European module rose in cost toward $4.5 billion, the Japanese toward $2 billion. In the European case the opportunity to borrow from equipment in Spacelab did not seem to make much difference. In the Japanese it may have been the novelty of everything, the need to begin at the beginning; whatever the reason, costs escalated. For the Canadian arm the Ottawa government expected to spend

about $1 billion, ten times the cost of Canadarm. It was to be a much larger arm, fifty-eight-feet long, with a payload capacity of 128 tons. Two smaller arms would contain up to nineteen joints to perform finely detailed tasks that otherwise would have to be done during a spacewalk by an astronaut. The price might increase even more because of the awkwardness of using the arm in the extreme darkness, or brightness, of space, which skewed human estimates of speeds and distances; experiments by shuttle crews showed that. This might mean a robotic vision system with a computerized eye. Moreover, the size of the space station might require far more repairs than had been estimated, and for this the station crews would need the arm equipped with all possible gadgetry. Spacewalks were dangerous because of radiation, the risk of being stranded, and the possibility of astronauts being struck by floating debris.[30]

Over the entire plan for international cooperation lay the complexities of dealing with four groups of space station participants--Americans, Europeans, Japanese, and Canadians. Cooperation virtually required a manual, a variant of Robert's Rules of Order, before any kind of conversation took place. When any issue arose, there was extreme awkwardness in how to decide. There were three program coordination committees, U.S.-ESA, U.S.-Japan, U.S.-Canada. That is, at the outset there had to be three decisions to approve a joint program plan. Mundane decisions might be fairly easy. For larger decisions there were so-called MOUs--memoranda of understanding. Here was more confusion

because of a double standard of promises. On the American side an MOU meant only an agreement with NASA. For the international partners it meant intergovernmental agreements, IGAs, carrying the force of a treaty. This put the U.S. in the awkward position (for its international partners) of exchanging simple promises for ironclad, binding agreements. If NASA decided to go back on an MOU it could do so, with a bow and scrape and no more; the other nations would have to renegotiate everything with their presidents, premiers, and parliaments.[31]

This said nothing of possible conflicts among international crew members operating the future space station. On this subject the possibilities were incapable of being overlooked, according to psychiatrist Patricia Santy of NASA's medical sciences division at the Johnson Space Center in Houston. According to an IGA of 1988 the U.S. would have criminal jurisdiction about space station Freedom. But the American government was to consult with the miscreant's government before proceeding to trial. A designated space station commander, a career astronaut, not a scientist, would have final authority in resolving operational disputes. Hence the need to know about foreign cultures, related Dr. Santy--how long you are in the shower, how you eat. Because of the heterogeneity of residents aboard space station Freedom, NASA in 1991 was drafting a code of conduct.[32]

A question arose, incidentally, about press relations aboard the future space station. Cable News Network approached the administration of President George Bush about the possibility of

a small bureau on space station Freedom. Suppose Reuters also asked for a bureau?

Congress and the Space Station

As if all these complications did not suffice, Congress in 1990 informed NASA of the need to cut $6 billion off the space station project over the next five years. This was serious. The cost of the project had risen from $8 billion to $14.5 billion, and then soared to (including the international contribution) $38 billion. There were two ways to make the cuts required by Congress, and NASA chose both. One was to stretch out the program, with "milestones" or points of achievement farther apart. This meant milestones well beyond the turn of the century, far beyond President Reagan's milestone of a single decade after 1984. The other was to reduce the size of the station, which NASA redefined from a projected 508 feet to 353 feet. This meant cutting it down from nearly the length of the capitol building in Washington (751 feet) to a mere football field size. Reduction in size meant fewer shuttle flights to take up "Tinkertoy" components of the station, six electricity-producing solar panels instead of eight, perhaps fewer experiments. It meant fewer people in the crew and less water to carry up on the shuttle (the water requirement every three months would now be only nine tons). A smaller station meant less maintenance--fewer adjustments with the Canadian arm, fewer spacewalks, fewer chances of being hit in space.

Reducing the size of the station--known felicitously as

rephasing, descoping, or restructuring--produced mixed feelings among the space partners. A distinct point of irritation was that NASA announced the smaller station without consulting its partners, an act oddly reminiscent of the International Solar Polar Mission a decade before. Perhaps this was because the partners were bound by IGAs and NASA only by MOUs. For the ESA partners downsizing itself was satisfying. They were having budget woes, notably the Germans who were trying to swallow East Germany. "If NASA is going to reduce their space station, I think we have the right to reduce ours as well," said a German, forthrightly, speaking of the ESA module, mostly German-financed. On the Japanese side down-sizing similarly brought approval, if for a different reason. When a Japanese Space Agency official, T. Kato, said his team was "moving pretty good," there was a touch of national pride in his voice. "We didn't change any lengths. Ours was to be the shortest module. Now is will be the longest."[33] For Japan, however, stretching out the milestones was worrisome, because delays would increase costs.

Then in February 1993, came another order to rephase, descope, and restructure, this time not from Congress but the incoming administration of President William J. Clinton. NASA officials moved immediately to the task, with a promptness that was almost embarrassing, making an observer wonder why NASA needed even the 353-foot station, downsized from the 508-foot station. Administrator Daniel S. Goldin announced that "We stand at the doorstep of an incredible opportunity." Under the first

downsizing the space station still would have taken more than a decade to build. "If we continued with hugh long-term projects," he now said, "the technology will always be outdated. Do we want to be up there with something in the year 2030 that was designed in the 1980s?"[34]

But the congressional reduction announced in 1990, what one wag described as the equivalent of NASA's moving from the Hyatt Regency to Motel 6, and the Clinton administration's downsizing of 1993, came by chance just at the time when the Soviet Union fell apart and a sudden, altogether unexpected development now forced itself into the calculations of NASA's plans for space station Freedom: the Russians, of all people, promised to come to NASA's assistance in solving some, perhaps all, of the station's problems. The C.I.S. nations, heirs to the U.S.S.R.'s space program espied an opportunity to ease NASA's budget woes. The easements they proposed were highly embarrassing for they displayed some of the successes of the Soviet space program and quickly gained support from America's space allies who, if the truth were told, had never been enthusiastic for the space station, even at its very beginning.

C.I.S. promised to get NASA out of all its predicaments. The space station could be a complete turnaround from the Moon race of the 1960s. First the C.I.S. nations presented a way out of the nearly impossible cost of shuttle launchings. Downsizing the space station meant fewer launches, all to the good, but not enough to count. Simple maintenance of facilities at Kennedy

Space Center was so raising launch costs that when Endeavour fixed a rogue satellite in 1992 that cost $270 million to build and launch, it would have been cheaper to throw the satellite away.[35] The defense department had paid for ten shuttle missions, contrary to the injunction of Caspar Weinberger, but in 1992 they came to an end. The possible C.I.S. solution to shuttle costs was a twenty-story rocket, Energiya, which first flew in 1987. One Energiya might cost $500 million, and it was estimated that four, accompanied by four shuttles to unload the freighters and assemble the space station (cost of each shuttle flight: $1 billion), would do the job.[36] Total cost would be $6 billion, compared to twenty-two shuttle flights ($22 billion). This could mean a $16 billion saving. Apart from the saving there were two other pluses. Energiya would avoid the problem of space station components being "shuttle compatible," that is, fitting into a cylinder the size of the shuttle. It would avoid the distinct possibility of another Challenger accident if the shuttle flew twenty-two flights to loft the station and ten more to supply the station once up. But then there were minuses. NASA engineers have spent years making the space station shuttle-compatible, and to use a heavy-lift vehicle would force redesign of the station, to assemble and integrate larger pieces on the ground. Only two Energiyas have been tested. Moreover, Energiya uses four one-stage Zenit rockets as its own first stage, and in separate launches Zenits have failed several times. Zenit also is produced in the Ukraine, and if any trouble occurred between

Ukraine and Russia (developer of Energiya) the Energiya program would have to terminate. Using Energiya meant taking station components to Tyuratam in Kazakhistan. It meant using Russian ground-launch crews. Would Russian political stability last for the life of the space station, an estimated thirty years?[37]

A second Russian suggestion to NASA was the possibility of junking space station Freedom and using the Russian Mir station. The cost of the American space station was driving the Europeans in that direction, because of the danger (just like Spacelab) of no money for experiments in the Columbus module (ESA had retained the name of Columbus from the once-talked-about ESA space station). Russian stations admittedly were small, and not built for thirty years. They were only occasionally, not permanently, manned. But NASA in opting a second time for a smaller station, this time under the direction of President Clinton, said that it would not have a permanent crew. At that juncture why not take Mir? Innumerable people had lived in the Mir stations, including a representative of almost every nation in the erstwhile eastern bloc. The Russians held the space endurance record by a wide margin, 366 days. ESA announced plans to use Mir to train and launch astronauts. In 1990 the Japanese Broadcasting System (not the Japanese government) reportedly paid $12 million to send a journalist, Toyohiro Akiyama, on a trip to Mir. The logical next step would be to propose a substitution of Mir for Freedom.[38]

Another Russian solution to a NASA problem was the Assured Crew Return Vehicle, or lifeboat. NASA officials said nothing

about the lifeboat when they proposed the space station. Nor did they say anything about it when they scaled down the station in 1990, for the scaledown reduced crew size, between shuttle visits, to four. They could have set the figure at four on purpose; the Soviet lifeboat, the Soyuz-TM, takes three. NASA had studied a four-person rescue vehicle but estimates it would cost $1.6 billion. The Soyuz-TM would cost $30 million, not counting adaptation costs. Unfortunately to land the Soyuz-TM requires a land base of at least nineteen square miles, within certain latitudes. There are no decent sites in the U.S. where the only areas in range are southern Texas and Florida. But Australia would be possible. After NASA in 1992 signed a $1 million contract with NPO Energiya, builder of the Soyuz, forty engineers and managers met in Houston to discuss the lifeboat issue. Russian participants in working group sessions were previously involved with Apollo-Soyuz in 1970-75. It was their first visit to the Johnson Space Center since that time.[39]

Commercial Applications and the President

Lastly one turns to the international commercial application of space. Begun with international competition, U.S.S.R. versus U.S., the space age began to show complexities far beyond Cold War competition when the commercial advantages of space technology attracted the nations in the early 1960s, even before the U.S. triumph with the Moon landing.[40] NASA in 1962 launched the first two international satellites: Ariel, with a scientific payload for the British, and Alouette for the Canadians. That

same year President Kennedy signed the Communications Satellite Act, which established the Communications Satellite Corporation (COMSAT), to cooperate with other countries in producing an operational system, and to provide services to other countries. Then in 1963 came the beginning of an almost revolutionary use of communications satellites: the United States placed the first such satellite in geostationary orbit at 35,880 kilometers above the equator. In this orbit a satellite will maintain a fixed position as compared to a given point on the ground. The satellite receives signals from a ground station, boosts its power, and almost instantly retransmits the signal to other ground station or stations. Three properly positioned geostationary satellites can provide world-wide communication.

One year after the first U.S. communications satellite, the U.S. internationalized the technology, through the International Telecommunication Satellite Organization (INTELSAT), "to achieve a global commercial telecommunications satellite system to provide, for the benefit of mankind, the most efficient and economical facilities possible, consistent with the best and most equitable use of the radio-frequency spectrum and orbital space." Founded by nineteen nations, it eventually gained well over a hundred members, and even the Soviet Union in 1991--this after attempting to create its own system, INTERSPUTNIK. When the U.S.S.R. gave way to the C.I.S., the successor nations of Russia, Bealarus, and Ukraine joined INTELSAT. At the beginning, under U.S. sponsorship, INTELSAT was very much an American

organization, with the United States controlling sixty-one percent of the voting authority and all the technology. U.S. laws forbade sale of launch technology to Europe, and NASA was forbidden to provide launch service for satellites competing with INTELSAT. Understandably these restrictions later were relaxed. At the present writing, 1993, INTELSAT has fifteen satellites in orbit and carries roughly two-thirds of the world's overseas telecommunications traffic including telephone, telegraph, telex, television, data, and facsimile services. It carries out the principle in the Outer Space Treaty: "The . . . use of outer space . . . shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."

The new network inspired the International Maritime Satellite Organization (INMARSAT), founded in 1976 for maritime communications, with sixty-some members by the early 1990s. The Soviet Union was a founding member of INMARSAT and after creation of the C.I.S. its membership included Russia, Belarus, and Ukraine. INMARSAT

> seeks to make provision for the space segment necessary for improving maritime communications and, as practicable, aeronautical communications, thereby assisting in improving communications for distress and safety of life, communications for air traffic services, the efficiency and management of ships and aircraft, maritime and aeronautical

public correspondence services and radio-determination capabilities.

As the above list of purposes shows, INMARSAT from the outset had the possibility of extending its purview well beyond maritime communications, and in 1985 amendments to its convention gave it a mandate of providing global aeronautical communication services. In 1990 it introduced commercial aeronautical services for airlines and corporate aircraft that currently include telephone, facsimile, telex, mail, data, position reporting, and fleet management, as well as distress and safety communications. It is also developing land mobile communications. It is also developing land mobile communications.

The Soviets in 1971 established the first domestic communications satellite system, enormously helpful because of their country's great territorial expanse, deploying four satellites in elliptical orbits--better than geostationary because of long linger times over the northern hemisphere. C.I.S. continuation and expansion of the several domestic systems now operating over the former Soviet Union obviously will help make C.I.S. countries more attractive to foreign investment.

After the Soviet Union established its first domestic satellite system many other countries followed. Naturally the next was Canada, again with a great physical expanse, followed by the U.S., Japan, India, Europe collectively (EUTELSAT) and individually, Indonesia, China, Mexico, Brazil, Australia, and members of the Arab League (ARABSAT). There also is EUMETSAT,

the European Organization for Meteorological Satellites, established to ensure operation of Meteosat, the first European meteorological satellite, launched by ESA IN 1977. EUMETSAT usually has two Meteosats in orbit.

In recent years the U.S. has developed navigation systems that are marvels of space science and make navigation an entirely new proposition compared to the complicated and hand-held instruments of the distant past. One system, operated by the U.S. Navy, is the Navy Navigation Satellite System, which provides two-dimensional data (latitude and longitude). Primarily for military users, the system is open to civilian shipowners. Actually ninety percent of users are civilian. The other system, not yet fully operational, was used extensively by U.S. and allied forces in the Persian Gulf War of 1991, and is called the NAVSTAR Global Positional System, or NAVSTAR GPS. It will require a total of eighteen satellites, of which four must be in view at one time, in order to provide three-dimensional data (latitude, longitude, and altitude), twenty-four hours a day, anywhere in the world, in all weather conditions. The system will operate at two levels of accuracy, a "coarse" level telling users their positions within one hundred meters, and a "precise" level within sixteen. The department of defense plans to make the coarse level available to civilian users.

Satellite observance of weather conditions around the globe has also become commonplace. The predictors of weather in times past were of course little more than soothsayers, who if they did

not engage in divination took measures no more scientific than to calculate prevailing winds. Now all that has changed. The first global cloud-cover picture was taken in 1960, and three years later came automatic transmission of pictures, allowing real-time readout of local cloud pictures using an inexpensive ground station. The first spacecraft for the U.S. Weather Service went up in 1965, a spin-stabilized configuration with two television cameras, placed in sun-synchronous orbit. In 1970 it became possible to obtain day and night cloud-cover observations. Between 1975 and 1991 the U.S. launched twenty-nine weather observations satellites, not counting such satellites launched for the Department of Defense.

From these U.S. beginnings the other nations developed their systems, and the U.S., ESA, and Japan now operate a world-wide network of high altitude weather satellites that provides weather information for the rest of the world. Satellite-supplying participants help each other, as happened in a notable instance in February 1993. Ordinarily the U.S. maintains two satellites. One failed in 1989. The survivor, launched in 1987, had an intended five-year life. Its presumed replacement, the first of a new generation, was not ready because of schedule delays and budget overruns. The U.S. borrowed a spare ESA satellite, Meteosat-3, which moved from a position over the Atlantic coast of South America to the Pacific side. It was necessary, however, to delay the move until the U.S. built an $11 million communications relay station in Wallops, Virginia, for Meteosat-

3 was controlled by a station in Darmstadt, Germany.[41]

A graphic illustration of what weather observation satellites could do occurred when in 1985 a devastating cyclone approached Bangladesh. Fortunately the Agency for International Development had financed and built a satellite weather-alert system, developed by NASA and operated by the National Oceanographic and Atmospheric Administration, the latter an agency of the Department of Commerce. In the past twenty years Bangladesh with nearly one hundred million people had suffered an estimated 390,000 deaths from twenty-eight cyclones and other storms. In the cyclone of 1985 the toll was perhaps 10,000, a great deal less than would have happened without the satellite system.[42]

The Land Remote-Sensing Commercialization Act of 1984 (Landsat Act) promotes commercial distribution of data from Landsat remote-sensing satellites, of major benefit in managing the earth's natural resources. The secretary of commerce is responsible also for this system and contracts with a private group, Earth Observation Satellite Company, for marketing received data.

With the various satellite systems in orbit, finished or about to be (NAVSTAR OPS is expected to be completed by 1993), the world has become a far different place. The first communications satellite for INTELSAT, Early Bird, had a capacity of 240 telephone circuits or one television channel. Each of the latest INTELSAT VI satellites can carry 24,000 telephone circuits

as well as three television channels. By the end of 1980s the INTELSAT system was being used by more than one hundred and fifty nations, counting nonmembers, with over 640 earth stations connected by 2,259 transmission paths.[43] Communications became "a whole new ball game" a result. Weather observation, navigation, and earth resources monitoring did so too.

The success especially of INTELSAT irritated the France of President de Gaulle, and the French took the lead in Western Europe in challenging American supremacy in communications satellites. Nations of Western Europe belonging to predecessor organizations of ESA agreed to a European launcher, Ariane, eventually handled under contract by a French company, Arianespace, with the purpose of putting satellites into geostationary orbit. Ariane made its last test flight in 1981 and was ready for business. With launches from French Guiana, capable of lifting two satelliltes into orbit, it soon proved its worth. When President Reagan removed commercial payloads from the shuttle, Ariane began to vie for American payloads. In addition it launched scientific loads, such as a spacecraft named Giotto, which sailed off to Halley's Comet in 1985. It was the only one of five Halley's Comet probes to enter the nucleus of the comet, and returned excellent data. The Challenger disaster in 1986, which destroyed an American shuttle and its entire crew, canceled the U.S. plan to observe the comet.[44]

Japan too sought to develop launch vehicles and satellites beginning in the 1970s, initially by persuading the United States

to license the technology. Licenses carried limits less advanced that "state of the art." Japan also could not launch non-Japanese payloads without permission. Unlike the French, the Japanese found this arrangement satisfactory, and allowed the expected first launch date for their commercial rocket to slip from 1992 to 1993. Meanwhile Japan launched communications and weather satellites with American-supplied boosters. Japan has produced small boosters for science satellites. An issue arose between the two countries over unfair trading practices, namely, that Japan closed its communications satellite market to U.S. competition. In 1990, Japan agreed to allow foreign suppliers to bid for operational satellites, and a contract went to Space Systems/Loral (formerly Ford Aerospace). India and Israel also have capaity to enter the commercial satellite market, but thus far have not made many space launches.

China entered the competition, with its first commercial launch in 1987 (China launched its first military satellite in 1970), taking a materials processing experiment into space for a French company. The Chinese arranged a similar flight next year for a German consortium, Intospace. A third was a communications satellite for Asiasat, Inc., a compnay based in Hong Kong. Following the Tiananmen Square uprising a question arose over whether to allow Chinese vehicles to launch U.S. satellites. The Chinese in 1991 launched only a single communications satellite, designated for geostationary orbit; a failure of the Long March-3's third-stage rocket left it in the wrong orbit. Meanwhile

other contretemps were making China's role in commercial launches difficult. Because the difference between civil and military rockets is minuscule, the U.S. was sensitive to any export of Chinese rockets. In 1991, President Bush announced it would be inappropriate to approve further export licenses for satellite components launched by China. Technically speaking the exports covered by the Missile Technology Control Regime (MTCR) did not include satellite components, only rockets--but the Chinese were proposing to launch a Swedish satellite with U.S. components and this fact gave the president leverage. When the Chinese agreed to adhere to the MTCR, the president lifted the sanctions. Another difficulty with China concerned an agreement signed in 1989 that China would charge prices "on a par" with Western launch-service providers. The Chinese contracted with the Arab Satellite Consortium for a $25-million launch, and France objected because of the low price. ESA's Arianespace later received the contract. The the perennial human rights difficulties with China again intervened against Chinese commercial launches. China had contracts to launch three foreign satellites in 1992, two for Australia, one for Sweden. But in the spring of 1991, Indonesia chose an American company, McDonnell Douglas, to launch its Palapa satellite instead of selecting the China Great Wall Industry Corporation, probably because of uncertainty surrounding U.S. export of components for satellites launched by China.

After the Soviet Union broke up, the C.I.S. nations gave

evidence of entering the space business, perhaps in an indirect way. An ingenious proposal came from an Australian company, Cape York Space Agency, to avoid technology transfer problems by buying Zenit rockets and sending them up from Cape York, Australia. This would circumvent the U.S. ban on export to the Soviet Union/C.I.S. countries of satellites containing U.S. components. The agency would own the rockets, and an Australian or American company (perhaps U.S. Space Boosters, Inc., a division of United Technologies) could put the satellites on the rockets, so no Russians needed to go near the launch site. U.S. companies in the commercial launch business--McDonnell Douglas, General Dynamics, and Martin Marietta--objected to U.S. Space Boosters' application for a technical assistance agreement from the state department, claiming it would permit C.I.S. (and Chinese) launch-service providers to lower prices and undercut the launch market. The Cape York Space Agency were bankrupt, but another Australian company, Space Transportation Systems, attempted to proceed with the idea.

Another scheme to bring in the Russians surfaced in 1991. The proposal was to sell military satellites, weighing five hundred pounds, launched six at a time on a single Soviet Tsyklon booster. The hope was to have the first set of commercial versions in orbit on a launch in 1993. A twenty-four spacecraft constellation could be opeerational by 1995. An American support group appeared, the Consortium of Small Satellite Constructors and Servie Providers, based in Warwick, New York. By having the

Soviets build and launch the system, the group would avoid U.S. licensing requirements. It all sounded like suitably capitalist enterprise. The satellites were designed by NPO Precision Instruments of Moscow and built by NPO Applied Mechanics of Krasnoyarsk.[45]

Conclusion

And so, in not yet forty years, from 1957 to 1993, the date of writing, the space age has had its beginnings and passed into something resembling--one uses the word gingerly--maturity. In no single aspect of human activity since October 1957, has there been so many changes, so many accomplishments, as in the science and technology of space.

Perhaps the most important change has been the marked shift from U.S.-U.S.S.R. competition to widespread international cooperation. To be sure, in NASA's statutory statement of 1958 a mandate appeared for international cooperation: "The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." President Kennedy asked the nations to "do the big things together." Competition, however, occurred if only because of the military implications of space science and because of the unstable nature of American public opinion--the latter being certain that "the Russians are ahead!" On their part the leaders of the Soviet Union did their worst to instill among Western audiences a belief that the U.S. and the U.S.S.R. were racing for supremacy in space and that the Soviet Union was

ahead. Throughout the latter 1950s this was the nature of the space age and such also was its nature into the 1960s when the Soviets tried to beat the Americans to the Moon and failed only because they could not produce boosters capable of lifting their space capsules.

In the mid-1960s competition began to change toward cooperation, for the Soviet Union's leaders realized that their space scientists simply could not make the boosters they so desperately needed, and at about the same time U.S. leadership with INTELSAT showed the way toward an international cooperation that would transform communiations on land and sea, bringing the world together in ways that all the heralded revolutions in communications of the nineteenth century, telegraphs and telephones and steam navigation, failed to accomplish. It is a curious but now obvious truth that at the height of the Cold War, during the Kennedy-Khrushchev confrontation over Cuba and the Soviet race to obtain equality in intercontinental ballistic missiles, a race that achieved what Henry A. Kissinger in 1969 described as sufficiency, a turn of events in space science pointed to cooperation. Thereafter, with increasing internationalization of the science and technology and now with the end of the Cold War and collapse of the Soviet Union, international cooperation became ever more evident.

It has been a long passage from the 1950s to the 1990s. Not all the great feats in space talked about have become possible. Some may never be possible. But the challenges are there, and

beckon in ways that older frontiers never did. The national projects of the past now seem terribly old-fashioned, and riddance to them. The future of U.S. leadership, and the president is pointing in this direction, is toward greater cooperation with other nations in the exploration of space for the benefit of all humanity.

Notes

1. According to Yuli B. Khariton, aged eighty-eight, a participant in the Soviet nuclear program from its inception, the Soviets were well on their way toward making their own A-bomb when they received the full plans of the American bomb. Stalin advised using the plans, remarking that "we have to move broadly, with Russian sweep." In 1951 the Soviets detonated their own version (New York Times, January 14, 1993). Khariton also related that Andrei D. Sakharov produced an H-bomb in 1953. All the evidence is to the contrary, however (William J. Broad, "Soviets Shown to Have Lagged on H-Bomb in 50's," ibid., October 7, 1990). But in offering this assertion Khariton raised an interesting possibility that, if true, would underline Soviet nuclear weakness. Just before the Soviet test of the supposed H-bomb in 1953 (it was an enhanced atomic bomb, wrapped in layers of the compound lithium deuteride, equal at most to a megaton on T.N.T.) he says that Stalin asked the physicist who directed the Soviet nuclear program, Igor V. Kurchatov, whether there was enough plutonium to build to such bombs, to keep one "in reserve." Kurchatov replied that there was only enough for one (implying that in 1949-1953 the Russians had no nuclear weapons).

2. Herbert York, Race to Oblivion (New York: Putnam, 1970).

3. The leading general account is Walter A. McDougall's ". . .

The Heavens and the Earth": A Political History of the Space Age (New York: Basic Books, 1985).

4. R. Cargill Hall, "Eisenhower, Open Skies, and Freedom of Space," pp. 24-25, as yet unpublished manuscript, NASA Historical Reference Collection, NASA Headquarters, Washington, DC.

5. Ibid., p. 9.

6. ". . . the IGY scientific satellite program was clearly identified as a stalking horse to establish the precedent of overflight in space for the eventual operation of its military alternate," (Ibid., p. 23). Also McDougall, ". . . the Heavens and the Earth," pp. 110, 194.

7. McDougall, ". . . the Heavens and the Earth," p. 258.

8. According to Johnson, "That sky had always been so friendly, and had brought us beautiful stars and moonlight and comfort and pleasure; all at once it seemed to have some question marks all over it because of this new development. I guess for the first time I started to realize that this country of mine might perhaps not be ahead in everything." John M. Logsdon, The Decision to Go to the Moon: Project Apollo and the National Interest (Cambridge, MA: The MIT Press, 1970), p. 21 For other Johnsonian statements on the space program, also his power plays, see Robert A. Divine, "Lyndon B. Johnson and the Politics of

Space," in Robert A. Divine, ed., The Johnson Years: Vietnam, the Environment, and Science (Lawrence: University Press of Kansas, 1987), pp. 218-253. Perhaps his best remark concerned the Apollo race: "I do not believe that this generation of Americans is willing to resign itself to going to bed each night by the light of a Communist moon" (p. 234). Johnson capitalized on Reedy's advice, and among other efforts worked through Senator Richard Russell of Georgia to get one of his presidential rivals in the Democratic party, Senator Stuart Symington of Missouri, out of the Sputnik investigation. The Democratic lawyer, James H. Rowe, Jr., also urged Johnson on (p. 220). Johnson did chair the military preparedness subcommittee hearings. He was not always present, and perhaps some of his overstatements may be credited to that fact. He clearly knew more than Kennedy about the real situation.

9. Logsdon, The Decision to Go to the Moon, recounts the decision to "go." Charles Murray and Catherine Bly Cox, Apollo: The Race to the Moon (New York: Simon and Schuster, 1989), provides an excellent overview of a complex subject. A well-written account of the efforts to build the Saturn launch vehicle by von Braun and his colleagues can be found in Frederick I. Ordway III and Mitchell R. Sharpe, The Rocket Team (New York: Crowell, 1979). NASA official histories of the subject include: Charles D. Benson and William Barnaby Faherty, Moonport: A History of Apollo Launch Facilities and Operations (NASA SP-

4204, 1978); Courtney G. Brooks, James M. Grimwood, and Loyd S. Swenson, Jr., Chariots for Apollo: A History of Manned Lunar Spacecraft (NASA SP-4205, 1979); Roger E. Bilstein, Stages to Saturn: A Technological History of the Apollo/Saturn Launch Vehicles (NASA SP-4206, 1980); Arnold S. Levine, Managing NASA in the Apollo Era (NASA SP-4102, 1982); W. David Compton, Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions (NASA SP-4214, 1989); and Sylvia D. Fries, NASA Engineers and the Age of Apollo (NASA SP-4104, 1992).

10. "We were eating their lunch, eating their lunch," Robert F. Freitag oral history, May 16, 1985, by Sylvia D. Kraemer, p. 31, NASA Historical Reference Collection, NASA Headquarters, Washington, DC.

11. Cost figures are in a letter from Webb to John L. Sloop, June 14, 1972, Si Info 9, Logsdon case file, NASA Historical Reference Collection.

12. Arnold W. Frutkin oral history, April 4, 1974, by Eugene M. Emme and Alex Roland, pp. 28-29, NASA Historical Reference Collection. "There was just no practical basis for giving any thought whatever to international cooperation in that program. I would argue that strenuously with anyone who thought that--I mean, given the premises of the Apollo program, it was absurd at that time to think of international cooperation, and so a very large segment of the program really went ahead without

international involvement. . . . It is also a very important thing to know that throughout the sixties, throughout the entire term of the sixties, no foreign government, no foreign official, ever hinted of a desire to enter the manned spaceflight program anyway, so there was no ready basis to build on." Frutkin oral history, July 30, 1970, by John M. Logsdon, pp. 17-18, NASA Historical Reference Collection. See also Frutkin's International Cooperation in Space (Englewood Cliffs, N.J.: Prentice-Hall, 1965).

13. For the following quotes see Ken Hechler, Toward the Endless Frontier: History of the Committee on Science and Technology, 1959-79 (Washington, DC: Government Printing Office, 1980), pp. 394-395.

14. See Edward Clinton Ezell and Linda Neuman Ezell, The Partnership: A History of the Apollo-Soyuz Test Project (Washington, DC: NASA SP-4209, 1978).

15. For an excellent survey of the literature see Roger D. Launius and Aaron K. Gillette, comps., Toward a History of the Space Shuttle: An Annotated Bibliography (Washington, 1992). This is the first volume in Studies in Aerospace History, sponsored by the NASA History Office.

16. Howard E. McCurdy, The Space Station Decision: Incremental Politics and Technological Choice (Baltimore, MD: Johns Hopkins

University Press, 1990), p. 72. McCurdy's book is an ideal combination of technical writing and high literary ability. He has a new book just out, Inside NASA: High Technology and Organizational Change in the American Space Program (Baltimore, MD: Johns Hopkins University Press, 1993).

17. Douglas R. Lord, Spacelab: An International Success Story (Washington, DC: National Aeronautics and Space Administration, 1987), p. 222.

18. McCurdy, The Space Station Decision, p. 200.

19. John M. Logsdon, "U.S.-European Cooperation in Space Science: A 25-Year Perspective," Science, 223 (January 6, 1984), 14. See also the amusing explanation in Adam Gruen, "Partners," pp. 92-93: "In effect, this left European nations to foot the bill for completing, storing, or junking their half of the program." Gruen's chapter is part of a manuscript on the space station that will take up where McCurdy's book stops. Copy in NASA History Office.

20. Lord, Spacelab, p. 274.

21. McCurdy, The Space Station Decision, p. 99.

22. Space News, June 17-23, 1991; McCurdy, The Space Shuttle Decision, p. 197. For this and subsequent references to aerospace periodicals, also most newspapers, I am indebted to Lee D.

Saegesser, archivist of the NASA History Office, who has systematically searched the periodicals and papers and clipped and filed anything bearing on NASA.

23. McCurdy, The Space Shuttle Decision, p. 202.

24. John M. Logsdon, Together in Orbit: The Origins of International Participation in Space Station Freedom (Washington, DC: George Washington University, 1991), pp. 37, 129-130.

25. For the following see McCurdy, The Space Station Decision, pp. 168-169, 171, 174, 232. McCurdy concludes (pp. 234-235) that to make the station politically acceptable, and the shuttle before it, "to preserve flexibility and save money, politicians managed to avoid a commitment to a long-range space policy for twenty years." The cost, he writes, to people who had to carry projects forward, was very high. Use of "incremental strategies" was especially evident in deciding on the space station.

26. Christian Science Monitor, October 21, 1992.

27. McCurdy, The Space Station Decision, p. 171.

28. Logsdon, Together in Orbit, pp. 48-53. "The issue of international participation was not separately raised with President Reagan; his approval came in the form of overall approval of the speech text" (p. 53). A year later Captain Freitag offered his own explanation of why the president support

the shuttle: "I think . . . he was a Boy Scout at heart. I think he had always been interested in space and this was nothing new. And that the whole shuttle enterprise was thrilling to him, and that things like that . . . People like Beggs were deeply influential with him. People like the Congress committee chairmen. The other thing about it, it was the only good answer. What other answer was there? . . . assuming you wanted a big project, assuming you wanted something that had all the virtues of maintaining NASA as a viable organization, yet serving a tremendous amount of apparent usefulness, there was no alternative. You can't build another shuttle this time; a lot of nickel-and-dime projects are interesting but . . . A mission to the moon is not going to grab it. There are no science projects of that magnitude. A telescope is big, but not that big. Mars is a long ways away. SDI might have been interesting from the standpoint of the defense side, but not on the civil side. So I think there is a certain lack of alternatives to it, too." Oral history, July 12, 1935, by Sylvia K. Kraemer, pp. 19-20, NASA Historical Reference Collection.

29. Logsdon, Together in Orbit, p. 62.

30. Houston Post, September 28, 1990; Space News, March 11-17, 1991; New York Times, October 30, 1992; NASA Station Break, November 1992. A large problem that needs international regulation is floating debris in space, which could threaten the

space station. A piece of debris the size of an aspirin tablet travels at twenty-two thousand miles an hour and packs the punch of a four-hundred-pound safe moving at sixty miles per hour. More than three and one-half million man-made objects are whirling in orbit. They may force the space station modules to use shields. The General Accounting Office has estimated a thirty-six percent chance that a piece of debris will strike a critical part of the station. Redesign to provide shielding could lower risk to twelve percent. The GAO report called on NASA to halt design work until it addresses the shield problem. Representative Barbara Boxer (D-CA), who is against the space station, called for an investigation (Space News, June 1-7, 1992). McCurdy, The Space Station Decision, p. 199, points out a domestic awkwardness of the proposed Canadian space-station arm. It had to compete with a proposal for a radar satellite providing all-weather monitoring of forest fires and sea lanes in remote regions, together with a communications satellite system to link mobile radio users in backwoods areas with the rest of Canada. There was only enough money for one project.

31. John M. Logsdon, "International Cooperation in the Space Station Programme: Assessing the Experience to Date," Space Policy, 7 (February 1991), 38, 41-44. For its special subject see chapters in Nandasiri Jasentuliyana, ed., Space Law: Development and Scope (Westport, CT: International Institute of Space Law, 1992).

32. Space News, March 18-24, 1991.

33. Washington Post, December 6, 1991; Aviation Week and Space Technology, February 25, March 11, 1991, and December 7, 1992.

34. New York Times, March 12, 1993.

35. Editorial in New York Times, May 15, 1992. It proved exceedingly difficult to attach the capture bar to the satellite, an apparently simple task for which the astronauts had prepared for two years, with training in an extremely expensive pool designed for such a purpose and recently finished at the Kennedy Space Center. The task was to get the satellite into the bay of the shuttle, attach a rocket, and send the satellite into its correct orbit. Incidentally the jockeying of the satellite raised questions about assembling a full-scale space station, with thousands of struts and components, sent up in pieces by shuttles.

36. Shuttle flight costs are a matter of debate. NASA has estimated a flight at $44 million, the "marginal cost" of adding a flight to the ongoing shuttle program, this for extra fuel and salaries. It calculated the "average cost" of a flight at $414 million. According to an outside team of academicians, if one adds the cost of repair and launching the cost per flight is $1.1 billion. Including costs of development and improvement jumped the figure to $1.7 billion (New York Times, March 22, 1993).

37. McCurdy, The Space Station Decision, pp. 73, 88; Space News, March 30-Apr. 5, September 28-Oct. 4, November 16-22, 1992; New York Times, August 23, 1992; Aerospace America, October, 1992, p. 31. Thirty years ago, Kenneth S. Pedersen has suggested, it would have seemed impossible to think of going to the moon or Mars aboard a "Titangia." Now (albeit with some new name) it just might happen. "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," Space Policy, 8 (August 1992), 217.

38. Space News, September 28-October 4, 1992. In 1971 the Soviets launched the first in a series of small orbiting laboratories named Salyut and took a conservative approach over the next fifteen years. Not until 1986 did they launch a module with a multiple docking port named Mir. They brought the crew back to earth before linking the first laboratory module. At no time did they attempt a permanently manned station. The Americans, however, "did not want to spend fifteen years plodding along with a small can in the sky." See McCurdy, The Space Station Decision, pp. 108-109.

39. Christian Science Monitor, October 21, 1992; Aerospace Daily, November 25, 1992; Aviation Week and Space Technology, December 7, 1992; Space News Roundup (Johnson Space Center), December 18, 1992, p. 4; Liz Tucci, "Agreement Blesses Soyuz Use as NASA Rescue Vehicle," Space News, December 14-20, 1992, p. 4.

The lifeboat issue has a side to it not often discussed. A former leading official in construction of Space Station Freedom has said that the reason he and his colleagues made no provision for a lifeboat was that in event of a disaster to the station no lifeboat would be available crew members would have perished. Presumably for political reasons this point is impossible to make publicly.

40. The following account is indebted to Marcia S. Smith, Space Activities of the United States, Soviet Union and Other Launching Countries/Organizations: 1957-1991 (Washington, DC: Congressional Research Service of the Library of Congress, 1992). The author is the library's specialist in science and technology policy in the division of science policy research. See also 26 Years of NASA International Programs (Washington, DC: National Aeronautics and Space Administration, 1984). As of January 1, 1984, NASA had engaged in thirty-eight cooperative spacecraft projects, 1,774 cooperative sounding-rocket projects, 163 cooperative ground-based projects for remote sensing, ninety-five reimbursable launchings of non-U.S. spacecraft, and was operating forty-eight overseas tracking stations in twenty countries. Resident research associateships had reached 1,412, and NASA had received 85,177 foreign visitors. NASA has not yet updated these figures.

41. New York Times, February 25, 1993.

42. Washington Times, May 29, 1985.

43. Jonathan F. Galloway, "Space Law in the United States," in Nandasiri Jasentuliyana, ed., Space Law, p. 78.

44. The arrangement for Ariane was closely linked with agreement to go ahead with the SA contribution to the American shuttle program; three days before signing an MOU with NASA on Spacelab the European countries decided to sign up for Ariane. Somewhat covered in a "package deal," the Europeans agreed to develop the maritime communications network and place all their enterprises under ESA. See John M. Logsdon, Together in Orbit, p. 11.

45. In addition to the U.S. marketing consortium, another group examining the spacecraft was SatelLife, a supplier of health-related information to developing nations (Aviation Week and Space Technology, March 25, 1991).

Chapter 7

National Leadership and Presidential Power

by

John M. Logsdon

Many benefits have been claimed for the space program--scientific discovery, economic growth, technological advancement, job maintenance, and educational excellence. None of these benefits mandate the degree of presidential involvement sought for this endeavor. National leadership does. The primary determinant of the president's overall attitude toward space has been the judgement of how useful the program is an instrument for projecting an image of U.S. global leadership. It is also the primary motive behind the myth of presidential leadership. If the president decides to project U.S. leadership through space achievements, space boosters believe, then the program will enjoy wide-spread political support. Conversely, if that link is not made, then the program can expect to struggle.

Several presidents have treated the space program as a demonstration of American leadership: certainly John Kennedy, probably Lyndon Johnson, and perhaps Ronald Reagan. Even Dwight Eisenhower and Richard Nixon sought to garner foreign policy advantages through the space effort in their own modest ways. Why then has the space program struggled in its quest for political support? None of these presidents--except perhaps Kennedy--has thought it necessary for the United States to be

preeminent in space, despite much rhetoric to the contrary. Preeminence is defined here as "being clearly leading or dominant." To date, no U.S. president with the possible exception of John Kennedy has been willing to allocate the funds necessary to achieve across-the-board preeminence.

The resulting contradiction has both fed and weakened the myth of presidential leadership. The rhetoric of national preeminence has encouraged advocates of space exploration to believe in presidential power, a consequence of the president's special advantages in setting the national agenda where the security of America's international standing is involved. As Arthur Schlesinger has observed, challenges to American security in "an increasingly perilous world" have been a primary force compelling the "concentration of authority in the Presidency."[1] Advocates of space exploration have clearly understood the political advantages to be gained by treating the program as a matter of national leadership in the world.

At the same time, no president except Kennedy has attached to the space program the sort of life-or-death priority that has characterized other great national imperatives of the twentieth century such as the Manhattan project that led to the development of the atomic bomb. Space enthusiasts like to think that extraterrestrial exploration deserves such a mandate, a view excited by the crash program to send humans to the Moon. Few presidents, as this chapter reveals, have defined space leadership in those terms.

Leadership

To begin, it is necessary to try to give a little substance to the term leadership that is at the heart of this analysis. The quest for leadership has been a central feature of U.S. space policy from the very beginning. The bill that the Eisenhower administration sent to Congress in April 1958, which became the Space Act of 1958, set as a policy objective "the preservation of the role of the United States as a leader in aeronautical and space science and technology."[2] Eisenhower's objective is notable in its use of the article "a" as opposed to "the." The president's bill did not ask Congress for a formal statement of policy that called for the United States to be the leader in space science and technology, but rather, a leader.

Indeed, over the past 35 years, the word leadership has been pervasive in most discussions and reports dealing with space, to the point that it almost loses any specific meaning and becomes only expected rhetoric. In fact, there are many possible meanings for the term leadership. Some have to do with relative standing in a competition, identifying who is "ahead" by some measure. Other definitions describe the absolute character or quality of a country's efforts; in this case, there can be many leaders. But beneath the rhetoric is a basic understanding--that being perceived by others, and by itself, as being at the forefront of space capabilities and achievements is in the American national interest.

The United States has actively sought space leadership when

the sitting president has made the judgement that such leadership was an important element of U.S. power. In this context, U.S. power is defined as the ability to influence events and choices around the world so that they are congruent with American interests. It is a little bit unfashionable to talk about power and its use, and members of the space community do not usually link space activities to the creation and use of national power. The desire for power in international relations can be seen, however, as the fundamental underpinning of the U.S. quest for space leadership. A brief and selective overview of how various presidents have assessed the links among the concept of leadership, the U.S. civilian space program, national power, and international prestige is instructive in this regard.

Historical Overview

Dwight D. Eisenhower was never totally convinced that being a leader in space was important to U.S. international interests. He certainly heard arguments to the contrary, but he used the power of his presidential office to reign in advocates of an expensive and aggressive space program. As early as May 1955, he approved a space policy statement, National Security Council (NSC) 5520, that warned:

> considerable prestige and psychological benefits will accrue to the nation which first is successful in launching a satellite. The inference of such a demonstration of advanced technology and its unmistakable relationship to intercontinental ballistic missile technology might have

important repercussions on the political determination of free world countries to resist Communist threats, especially if the USSR were to be first to establish a satellite."[3]

Eisenhower's resistance to the idea that the launch of a small satellite had any real significance to the relative military standing of the United States and the Soviet Union has been well documented by several historians, and the essay in this volume by Greenstein and Callahan makes the point well. The phrase "calm conservatism"[4] has been used to describe the president's stance as others pushed for early U.S. entry into a prestige-oriented space race with the U.S.S.R.[5] Even so, Eisenhower did approve two post-Sputnik space policy statements that made the link between space leadership and U.S. global interests. For example, the first post-Sputnik statement of U.S. space policy, NSC 5814/1 of August 1958, noted that "to be strong and bold in space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in U.S. scientific, technological, industrial and military strength." This statement also called for developing the space capabilities needed "to establish the United States as a recognized leader in space."[6]

However, Dwight Eisenhower was not willing to invest U.S. resources in space primarily on leadership grounds; rather, there had to be other tangible benefits for a project to be approved. Eisenhower acknowledged the space race, but was not willing to pay the price of a clearly leading position in that competition.

His attitude is perhaps best captured in an excerpt from his January 1960 space policy statement:

> To minimize the psychological advantages which the USSR has acquired as a result of space accomplishments, select from among those current or projected U.S. space activities of intrinsic military, scientific or technological value, [emphasis added] one or more projects which offer promise of obtaining a demonstrable effective advantage over the Soviets and, so far as is consistent with solid achievements in the over-all space program, stress these projects in present and future programming."[7]

In stark contrast, John F. Kennedy clearly was convinced of the link between space leadership and core U.S. interests, and that conviction led to his decision to use his public office to mobilize national will and resources that produced Project Apollo. The decision to go to the Moon has been described by Walter McDougall as an "overdetermined event;"[8] certainly the record on why Kennedy approved Apollo is very clear, and the quest for leadership was at the center of that decision. Eight days after the Soviet launch of the first human, Yuri Gagarin, into orbit, President Kennedy asked Vice President Lyndon B. Johnson to conduct a survey of where the U.S. stood in space. In particular, Kennedy asked, "Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip around the moon, or by a rocket to go to the moon and back with a man. Is there any other space program that promises dramatic results in

which we could win?"[9]

Johnson's reply was equally clear. The vice president transmitted to the president on May 8 a report penned by NASA Administrator James Webb and Secretary of Defense Robert McNamara that represented a radical change in policy from that of the Eisenhower administration. Rather than setting the terms for competition with the Soviet Union so that projects must have other elements of "intrinsic merit," the report recognized that

> Major successes, such as orbiting a man as the Soviets have just done, lend national prestige even though the scientific, commercial or military value of the undertaking may by ordinary standards be marginal or economically unjustified . . .
>
> This nation needs to make a positive decision to pursue space projects aimed at enhancing national prestige.[10]

What is not as clear is the consistency of Kennedy's view of the link between space achievement, U.S. leadership, and international realities. Apollo, for Kennedy, may have been more a response to the specific political situation in the first months of his presidency than a symbol of his longterm commitment to U.S. space leadership. Both in 1962 and 1963, Kennedy called for major, highly classified reviews of the space program to determine, among other issues, whether to go ahead with Apollo as planned.

Then, on September 20, 1963, speaking to the General Assembly of the United Nations, Kennedy suggested "a joint

expedition to the moon. . . . Why, therefore, should man's first flight to the moon be a matter of national competition?"[11] This was not a casual remark or speech writers' rhetoric; rather, it was indicative of the serious consideration being given by Kennedy and his advisers to recasting Apollo as a cooperative project. Just ten days before he was murdered, Kennedy issued a National Security Action Memorandum directing NASA Administrator James Webb to take the "initiative and central responsibility within the Government for the development of a program of substantive cooperation with the Soviet Union in the field of outer space." That program was to include "cooperation in lunar landing programs."[12]

If one were to give full credence to John Kennedy's public rhetoric, he above all U.S. presidents was committed placing the force of his office behind the goal of U.S. space leadership. This has led to the so-called Apollo syndrome of NASA, a belief that a president by his mere announcement of bold space programs can ensure their welfare. In private, and this was something most advocates of a strong space program did not know and have begun to perceive only within the last decade, Kennedy's approach seems to have been somewhat different as he wrestled with the reasonableness of what his public rhetoric had set in motion. In remarks the day before he was assassinated, Kennedy said "the space program stands on its own as a contribution to national strength. . . . I think the United States should be a leader . . . should be second to none."[13] Whether or not John Kennedy fully

subscribed to this view, history is likely to record him as the most pro-space president of the twentieth century. Certainly supporters of space exploration have already assigned him that distinction.

As senator and vice president, Lyndon Johnson seems to have been staunch supporter of the space program and a firm believer in the importance of space leadership to U.S. national interests. He played a key role in developing the recommendations that led to Apollo and in assembling the political coalition in support of the undertaking. When President Kennedy asked him in 1963 to identify the benefits that could flow from the space program, Johnson, in a May 13 response, noted that in addition to whatever tangible benefits might result:

> a much more fundamental issue is at stake--whether a dimension that can well dominate history for the next few centuries will be devoted to the social system of freedom or controlled by the social system of communism. . . . (O)ur space program has an overriding urgency that cannot be calculated solely in terms of industrial, scientific, or military development. The future of society is at stake.[14]

Within a little more than six months, Lyndon Johnson was president. Robert Dallek's paper in this volume quotes him as recalling for Walter Cronkite, "I think I spent more time in the space field . . . up to '63 than I did after I became President."[15] While Johnson's views regarding the importance of space were unlikely to have changed drastically, other concerns-

-financing the Great Society, urban unrest, and the draining conflict in Southeast Asia--dominated his presidency.

Johnson remained committed to finishing Apollo, but much to the frustration of NASA Administrator James Webb, he was unwilling to approve new projects that would build on the capabilities developed during the 1961-1965 space mobilization. After peaking in 1965, NASA's budget for space began a rapid downslide that was to continue for the next decade. Lyndon Johnson may have believed in the importance of space leadership, but he found himself unable to allocate to the space program the resources required to sustain that leadership once America reached the Moon. His support for space is unlikely to be recorded as one of the highlights of Lyndon Johnson's years in the White House. At the same time, his support for Apollo and his unwillingness to commit to large follow-on projects reinforced the image of the president as omnipotent. Space boosters took from this experience a lesson that the president must be convinced, and in that convincing the political requirements of support have been met.

By the time Richard Nixon assumed the presidency in January 1969, the NASA budget had been reduced to approximately $4 billion from its $5.2 billion peak. Nixon's space transition team, headed by Nobelist Charles Townes, told the new president that a budget at the $4 billion level was "adequate" and that at that budget level the United States could carry out "an adequately competitive space effort." The team believed that it

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was not necessary to compete with the Soviet Union "in detail," but that "the U.S. effort must be as strong overall as that of the Soviet Union."[16]

President Nixon seems to have taken to heart this less-than-ringing call to continued space leadership. Like everyone else, he basked in the glory of the first lunar landing in the summer of 1969. But when confronted by the bullish recommendations of the Space Task Group in September 1969, Nixon remained silent for six months, then announced in March 1970 that "our approach to space must be bold--but it must also be balanced. . . . Space expenditures must take their place within a rigorous system of national priorities."[17]

Reducing the priority and the budget demands of the space program after the first lunar landing was a conscious decision on Richard Nixon's part. He was advised that a majority of "the heart of your constituency" believed that less money should be spent on space.[18] After two years of reductions, however, one of the president's most trusted advisers told him that the cuts were going too far, and that NASA was being proposed for further reductions "because it is cuttable, not because it is doing a bad job or an unnecessary one."[19] Caspar Weinberger, then Deputy Director of the Office of Management and Budget, couched his argument against additional cuts in the NASA budget in terms of the space program's links to the U.S. image in the world:

> It would be confirming, in some respects, a belief that I fear is gaining credence at home and abroad: That our best

years are behind us, that we are turning inward, reducing our defense commitments, and voluntarily starting to give up our super-power status, and our desire to maintain our world superiority.

America should be able to afford something besides increased welfare, programs to repair our cities, or Appalachian relief and the like.[20]

Nixon, with his intense sense of world affairs, was taken by Weinberger's argument. At the top of the memo he penned, "I agree with Cap." NASA's budget slide began to bottom out, and the president within six months approved development of the Space Shuttle.

An important change in the way the United States would pursue space leadership occurred during the Nixon presidency. With the successful Apollo 11 mission, the United States had clearly won the space race. Now the United States would seek to expand its cooperative efforts with both its allies and with the Soviet Union. George Low recorded Nixon's views after a January, 1972 meeting with him:

The President said that he is most interested in making the space program a truly international program and that he had previously expressed that interest. He wanted us to stress international cooperation and participation for <u>all</u> nations. . . . he is not only interested in flying foreign astronauts, but also in other types of meaningful participation, both in experiments and even in space

hardware development.[21]

By demonstrating the quality of its capabilities within a cooperative project, the United States could continue as the leader even as nations began to work together in space. This is a theme in U.S. space policy that continues to today, albeit with some rough spots along the way. In adopting this position, space exploration champions once again believed that the president could have his way--since that was what was happening--and that Nixon had no interest in space. What was required, again, was the convincing of the president and with it everything would be good--as it had been in the heyday of Apollo.

There is little to specifically link Gerald Ford to major space policy or program decisions. Indeed, in most areas the two and one-half years of Ford's presidency were marked by continuity with the policy directions established during the Nixon administration. Space was no exception. No major decisions on space came to the White House while Ford was president, and he took no major initiatives. The NASA budget did begin a gradual climb upward, and in his last budget Ford approved "new starts" for both the Galileo mission to Jupiter and the Hubble Space Telescope. This is the most identifiable mark on space policy made by the Ford administration, since approving two major space science programs at the same time had not happened before 1977, and certainly has not happened since.

The tone of Jimmy Carter's approach to space may have been set by the advice given in his transition report on NASA, which

was prepared by an individual named Nick MacNeil. That report noted with a high degree of skepticism that a major argument in support of NASA was that "to keep our political and cultural values in high esteem, we must periodically give a display of technological virtuosity. . . . We transfer vigor and Number 1 status in a particular field, to the nation as a whole. Selling international prestige on this basis panders to people's insecurities." MacNeil suggested that the Carter administration "keep separate the sales pitches that involve international prestige, displays of power, Buck Rogers entertainment. These play up to our insecurities and offer satisfactions and diversions that are artificial."[22]

While these views may not have had a direct impact on President Carter's attitude toward space, he certainly did not embrace the concept that space leadership was important to core U.S. interests. The White House issued a statement of national space policy in October 1978 that took a quite measured view, noting that

> space activities will be pursued because they can be uniquely or more efficiently accomplished in space. Our space policy will become more evolutionary rather than centering around a single, massive engineering feat. Pluralistic objectives and needs of our society will set the course for future space efforts.[23]

The same statement listed the fourth of nine objectives of the civilian space program as being to "assure U.S. scientific

and technological leadership for the security and welfare of the nation . . ."[24] Like the switch in emphasis from competition to cooperation under Richard Nixon, this statement appears to mark a watershed in U.S. space policy. Rather than seeking leadership through achievement, now the United States would lead in technology and capability, without committing itself to their visible use.

An additional clue to Jimmy Carter's attitude toward the space program can be found in his Rose Garden remarks on the occasion of the tenth anniversary of the first lunar landing. After accepting mementos from Neil Armstrong and NASA Administrator Robert Frosch, the president noted that "we landed on the Moon because our Nation set a firm goal, and we united behind that effort." Then he went on to suggest that other priorities were more important in his view than space achievement: "Today, we face an equally challenging goal in fighting for energy security. . . . We will win energy security for our Nation in the same way we won the race to the Moon."[25] These were hardly the words of a president committed to U.S. leadership in space.

If his rhetoric were taken at face value, Ronald Reagan was a quite strong supporter of U.S. leadership in space. But, as noted in Lyn Ragsdale's paper in this volume, space during the Reagan presidency was not a top priority issue--at least not before the Challenger accident. In reality, President Reagan gave the civilian space program just enough priority and

budgetary support to allow it to move forward at a modest pace, but he certainly did not seize upon it as a major element of his presidential strategy. Reagan approved a major new initiative, the space station, and he did use it as a highly visible symbol of cooperation among the United States and its "friends and allies."[26] But in this arena the chinks in the armor of the "imperial presidency" began to be noticable. He could secure only limited funds for the station from Congress whose members did not accept it as an Apollo-like undertaking.

The Reagan space transition team was composed primarily of veterans of the space program; it was led by long-time NASA official George Low. Not surprisingly, particularly in contrast to the Carter transition document, the team's report was positive with respect to the values of the space program. The report noted that "national prestige is how others view us, the global perception of this country's intellectual, scientific, technological, and organizational capabilities. In recent history, the space program has been the unique positive factor in this regard."[27]

The first overall statement of space policy by the Reagan administration was issued on July 4, 1982, as the president witnessed a landing of the shuttle Columbia at Edwards Air Force Base. As Ragsdale notes, the event was staged as a patriotic festival. Second only to strengthening "the security of the United States" as an articulated policy goal was maintaining "United States space leadership."[28] Apparently, the goal of

leadership was to have higher priority under President Reagan than it had for his predecessor. But precisely what in practice was meant by the term was not clear.

One clue to the meaning (or lack thereof) of the term leadership in the thinking of the Reagan administration was its "National Space Strategy," which the president approved on August 15, 1984. The strategy said that:

> - The STS [Space Transportation System] is a critical factor in maintaining U.S. space leadership.
>
> - The development of a civil Space Station will further the goals of space leadership . . .
>
> - Major long-range goals for the civil space program are essential to meeting the national commitment to maintain United States leadership in space . . .
>
> - The U.S. civil space science program is an essential element of U.S. leadership in space. . . .[29]

In other words, by 1984 essentially everything the United States was doing in space was linked, at least rhetorically, to the quest for leadership. By 1988, the final Reagan-era statement of space policy said that "a fundamental objective guiding United States space activities has been, and continues to be, space leadership."[30] It is not clear that the term leadership retained much specific content at this point.

Possibly a more precise clue to what issues related to space were most important to Ronald Reagan can be gleaned from the highly polished NASA sales pitch for the space station that was presented to the president on December 1, 1983. Given that it certainly was in NASA's interest to stress those themes most likely to elicit a positive response from the president, they chose to highlight, among other things, that a United States space station would, "implement the overriding theme of your space policy: United States leadership in space."[31]

It is fair to say that the desire for leadership was an important factor in shaping Ronald Reagan's attitude toward space, but overall, President Reagan did not place top priority on a fast-paced U.S. space effort. Efforts to resurrect the notion of a "space station race" with the Soviet Union were not notably successful. By the end of his Presidency, Reagan was talking about space cooperation with our former adversary as well as with traditional U.S. friends and allies.

Preeminence

Preeminence differs from leadership as a goal of U.S. space policy. First of all, no president has uttered the word preeminence when talking about space, though the term does appear in several presidentially-approved policy statements. The closest a president may have come to doing so was in John F. Kennedy's May 25, 1961, speech announcing the acceleration of the program that included Apollo. Kennedy said that it was "time for this nation to take a clearly leading role in space

achievement."[32] But as has been suggested above, Kennedy in 1962 and 1963 wavered in his commitment to Apollo and to across-the-board preeminence in space achievements. In November 1962, James Webb told Kennedy that "the objective of our national space program is to become pre-eminent in all important aspects of this endeavor . . . ."[33] The question at the time was whether to give overriding priority to Apollo, even if that meant taking funds away from other space projects. Webb argued against such a move, and Kennedy did not take it. But that does not necessarily suggest that Kennedy accepted Webb's premise, given the president's other actions before and after November 1962.

Certainly no president since John Kennedy has given the space program the priority and budget required for "a clearly leading role" in all areas of space achievement. And yet the term preeminence has crept into the space policy statements of the past decade. It appeared first in the 1982 space policy statement, which set as an objective to "preserve the United States preeminence in critical major space activities to enable continued exploitation and exploration of space."[34]

By the final Reagan space policy statement in 1988, the call for preeminence had been refined as follows:

> Leadership in an increasingly competitive international environment does not require United States preeminence in all areas and disciplines of space enterprise. It does require United States preeminence in key areas of space activity critical to achieving our national security,

scientific, technical, economic, and foreign policy goals.[35]

Taken literally, this statement says that leadership requires preeminence, and that such preeminence is an important goal of U.S. space policy. At least as it applies to the civilian space program, this comes close to being a ridiculous statement, given the realities over the past decade of funding for space overall and particularly for the development of new capabilities. The United States may declare that "preeminence in critical areas of space activity" is its goal, but no president since John Kennedy has taken the actions necessary to achieve such preeminence. U.S. presidents have been willing at various times to take steps to pursue leadership of some type, but not preeminence.

The Future

Has the quest for leadership paid off in terms of benefits to the American nation? Is space leadership worth continued pursuit? What, indeed, is the meaning of space leadership in the 1990s, more than thirty years after the United States began its civilian space program?

Sally Ride did a good job of identifying the benefits of space leadership in her 1987 report Leadership and America's Future in Space. She noted that during the period when the United States "was clearly and unquestionably the leader in space exploration, . . . the nation reaped all the benefits of pride, international prestige, scientific advancement, and technological progress that such leadership provides."[36]

It is interesting that Dr. Ride lists pride as the first benefit of leadership. Writing almost thirty years ago, one of the first political scientists to take a hard look at the U.S. space program, Vernon van Dyke, titled his book Pride and Power: the Rationale of the Space Program. Probably, both van Dyke and Ride are correct--that a primary benefit of the perception of space leadership is internal to the United States. What being a leader in space says about the United States seems important to its citizens. Think only about the use of space accomplishments as national symbols, perhaps only behind the flag and a bald eagle in importance. And when the United States is not doing well in space--not being the leader--this country (at least if media attention is any indicator of public interest) is concerned and wants the causes of its problems in space to be fixed.

This emphasis on pride in the U.S. leadership position is not inconsistent with the focus here on space leadership as a source of U.S. power in the world. Pride in one's country is an essential base of national power. Nations can seldom exercise influence over others when they are beset by self-doubt or lack of confidence.

Certainly the United States "leads" in most space capabilities related to the projection of military power around the world, e.g., observation and warning systems, communications satellites, position-fixing systems, etc. That leadership is an important element of the recognition that the United States is today the only global superpower in military terms.

But presidential attitudes toward leadership in national security space systems is not really the topic in this essay--though maintaining such leadership is probably even more important in today's world than it has ever been. The issue here is whether leadership in civilian space capabilities and achievements has been a worthwhile goal for this country.

Have U.S. achievements in space over the past 35 years added measurably (taking that word literally) to U.S. influence in the world? In the final analysis, it is difficult to think of a way to identify and measure the independent contribution to U.S. international prestige of being perceived as a leader in space. There is no equation linking prestige with influence, power, and control over events and choices.

Between the time that John Kennedy announced the Apollo goal and the time that Neil Armstrong stepped onto the surface of the Moon, the United States had gotten involved in a land war in Southeast Asia, had endured a series of tense urban riots, and had suffered through a series of political assassinations. How does one calculate the difference in U.S. national prestige overall if Apollo had not been done, compared to that resulting from the Apollo success, in the context of everything else that shaped global attitudes toward the United States in the 1960s?

What can be said with some degree of confidence is that the notion that prestige is an important aspect of national power is well established among both students and practitioners of international relations and foreign policy. The desire to

enhance national prestige has been a consistent and strong motivation of national leaders and statesmen for a long time. Reputation is important in dealings among nations, just as it is in dealings between individuals or firms. As this essay has pointed out, several U.S. presidents have stressed the space program as a means of enhancing the U.S. reputation in the world.

Certainly, those in the space community--and it may be possible to extend this generalization to many if not most in the United States--have internalized the expectation that the United States has been, and will continue to be, a leader in space. That expectation is clearly expressed in statements of national space policy. Perhaps the primary benefit of space leadership can be found within each of us--we fully expect continued achievement in space to be part of our future. When push comes to shove we are willing to contribute (today's euphemism) our tax dollars to support a strong U.S. program.

In a very loose sense, the issue of U.S. space leadership--and particularly whether it continues to be worth pursuing--can be linked to the numerous analyses of America's relative standing in the world that have been so popular recently. Is America in decline, as people like Paul Kennedy have suggested, with the quest for space leadership part of our "imperial overstretch"?[37] Or is the United States Bound to Lead, with space leadership one of the bases for this country being able, as Joseph Nye suggests it must, to manage "the geopolitical balance of power inherited from the past, as well as the emerging interdependence that will

emerge in the future."[38] This is certainly an issue for later presidents to consider as they plot the country's future in the world.

To other sovereign nations, which are both our partners and our competitors in space and elsewhere, accepting the notion of the United States managing key areas of global relations is not very palatable. The foreign policy community around the world has been much more comfortable with the notion of U.S. leadership than the space community seems to be. Nonetheless, U.S. power, responsibly exercised, remains a key to a peaceful world with a growing quality of life. What the United States does in space can--and should--be closely linked to the emerging bases of global power. As a panel of the Bush administration's Vice President's Space Policy Advisory Board observed in its January 1993 report, "as part of the United States' continuing post Cold War leadership, space achievements must be widely viewed as a key to an improved world future."[39]

This is the concept of leadership that may guide future U.S. efforts in space--taking the lead in using space to improve life here on earth. This is a different concept of space leadership than has guided most past presidents, but it is one that will likely dominate the future.

Notes

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Chapter 8

Epilogue: Beyond NASA Exceptionalism

by

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and

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When President John F. Kennedy unveiled the commitment to undertake Project Apollo on May 25, 1961, in a speech before a joint session of Congress, he created more than a national space program to send humans to the Moon. He also created an image of presidential leadership that persisted long after the actual voyages ended. That image accentuated the power of the president to mobilize societal resources by setting specific national goals.

The image subsequently took on mythical qualities within the National Aeronautics and Space Administration (NASA). To the people associated with the U.S. space program, Kennedy's mandate stood as the most significant demonstration of the conditions necessary to prosecute a successful space program. It suggested to those people that extraterrestrial activities were above politics. In the years that followed, moreover, it provided an explanation for the ills afflicting NASA. Those ills were frequently traced to the lack of clear mandates or presidential support for endeavors that followed.

People in general subsequently embraced the image of the

young president as a means to promote other agendas. Calling for presidential commitments to conquor a variety of other ills, from poverty to AIDs, they too advanced the notion that America could be mobilized to accomplish great goals if only chief executives would create similar mandates. Kennedy's speech stands as one of high water marks in the perception of presidential leadership in the twentieth century, occurring as it did before images of Vietnam and Watergate tarnished the notion of executive deference.[1]

A careful examination of the record of presidential leadership in space exploration reveals that reality differs considerably from perceptions. Space policy is not above politics. Presidential mandates do not guarentee program success. Chief executives do not protect the civilian space agency from the partisanship, ideology, and "pork barrel" politics that affect other discretionary spending programs. A more realistic view of space policy would abandon the notion of NASA exceptionalism, as attractive as that notion continues to be.

The Dilemma of the "Golden Age"

Billed as a second State of the Union message, President Kennedy's speech told the Congress that the United States faced "an extraordinary challenge."

> Our strength as well as our convictions have imposed upon this nation the role of leader in freedom's cause. . . . This nation is engaged in a long and exacting test of the

future of freedom--a test which may well continue for decades to come.

Kennedy argued that the United States must compete in space "if we are to win the battle that is going on around the world between freedom and tyranny." Then he added: "I believe this Nation should commitment itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish."[2]

In announcing the Apollo commitment the president carefully gauged the mood of the nation. His rhetoric sought to capture the American imagination and overcome residual concerns regarding the difficulty and expense of the undertaking. The United States was locked in a struggle with the Soviet Union to convince uncommitted nations of the world of the superiority of the U.S. system at a time when the outcome of the Cold War was hardly clear. The Soviet system had bested the United States in putting both the first satellite and the first human in orbit. As John Logsdon has noted, "by entering the race with such a visible and dramatic commitment, the United States effectively undercut Soviet space spectaculars without doing much except announcing its intention to join the contest."[3]

A unique confluence of political necessity, personal commitment, scientific talent, economic prosperity, and public

mood made possible the ready acceptance of the 1961 decision to carry out an aggressive lunar landing program. Because of the president's challenge, framed as part of the Cold War contest between the communist nations and the "free world," NASA undertook a mobilization comparable, in relative scale, to the Manhattan Project in World War II and the national program to deploy an intercontinental ballistic missile system during the 1950s. Accordingly, the space agency's annual budget increased from $500 million in 1960 to $5.2 billion in 1965 as government and industry executives mobilized to combat what they considered a national crisis. Project Apollo, backed by sufficient funding, was the tangible result of solid national commitment in response to a perceived threat to U.S. welfare.[4]

As part of his speech on "Urgent National Needs" Kennedy announced twelve specific legislative proposals, of which only four dealt with space. The disposition of the other eight items in Kennedy's speech contrasted sharply with the congressional response to Kennedy's rhetoric on space. Of the other eight initiatives, Congress approved only four. They failed to enact the president's Manpower Development and Training program, refused to provide him with a foreign aid contingency fund, and voted down his request for a nation-wide system of fallout shelters to protect the populace "in the event of a large-scale nuclear attack." The fate of those eight items mirrored Kennedy's overall legislative success rate in 1961. During his first year in office, Kennedy submitted 355 specific requests to

the Congress. He won approval for 172, or slightly less than half. In historical perspective, that was a fairly low box score for a modern president in the first year of office.[5]

Kennedy worried that the Congress might treat his space initiatives with similar disrespect. Congressional debate was perfunctory, however, and NASA found itself literally pressing to expend the funds committed to it during the early 1960s. Congress approved all four space initiatives, including the first steps toward the Moon as Logsdon has noted "almost without a murmur."[6] Kennedy's speech subsequently took on mythical qualities as a demonstration of the president's power to set the national space agenda. With the speech and the events that preceded it, the president established a national objective, galvanized public support, enlisted the Congress, and set in motion the activities that mobilized a nation. The symbolism offered by Kennedy's decision was applied subsequently to a wide range of issues, from poverty and housing to health care ("if we can send a man to the Moon, why can't we _____?").

The symbolism has held special appeal for space boosters, the community of true believers who promote space exploration as one of the nation's most enduring legacies. To them, the lunar decision suggested that space exploration deserved special treatment within the American political system. Like foreign policy, space exploration seemed to enjoy a higher priority than domestic endeavors. Space exploration seemed to be above politics, meaning that it received far-reaching bi-partisan

support. Congress and the public seemed to defer to the president, generally acquiescing in the president's choice of objectives. The decision to go to the Moon suggested that a president could overcome partisan divisions and lead the nation to great accomplishments, if only the objective was properly framed. Many have argued that the subsequent ills of the space program can be traced to the unwillingness of more recent presidents to make "Apollo-like" public commitments.[7]

The Apollo Program, while an enormous achievement, left a divided legacy for NASA. The sprint to the Moon transformed NASA into an agency preoccupied with a single mission. Single issue agencies--like single issue political parties--have a difficult time dealing with success. A search for continued meaning always ensues afterward. Moreover, the results of Apollo, in contrast to what NASA had wanted, was largely a technological dead end for the space program. As sometime senior NASA official Hans Mark observed, "President Kennedy's objective was duly accomplished, but we paid a price: the Apollo program had no logical legacy."[8]

The "golden age" of Apollo also created for the agency an expectation that the issuance of a major space goal by the president would always bring NASA a broad consensus of support and provide it with resources as well as the license to dispense them as agency leaders saw fit. Most NASA officials did not understand at the time how exceptional the Apollo mandate was. The Apollo decision was an anomaly in the history of the U.S. space program.[9] NASA officials came to perceive as normal the

free-flowing funds, ready political support, and relative autonomy in conducting space activities when such was rarely the case.[10] This was the dilemma of the "golden age" of space exploration. Program success was predicated upon a set of conditions that could hardly be repeated.

The Presidential Prerogative in Space Policy

History shows that presidents prevail on more space issues than they lose. Yet, while presidents prevail on most of the space initiatives they propose, they are by no means omnipotent. They face significant opposition to initiatives that succeed and they occasionally fail. Their success rate on space initiatives is not much different from the success rate for presidential initiatives in general. In its annual review of congressional role call votes, the Congressional Quarterly research service reports that presidents prevail on about 70 percent of the key votes on which they take a position.[11] The success rate varies widely from year to year. Roll call votes are not equivalent to initiatives proposed (since the latter may be decided in committee), but the box scores suggest that the perception of presidential success on space issues may be due in part to the tendency of presidents to prevail on issues of all kinds.

For example, President Dwight D. Eisenhower played a central role in the decision to create NASA. He later used a presidential directive to assign NASA responsibility for Project Mercury (the program to put the first astronauts in space) in the face of demands to let the military run the program.[12] A

succession of presidents have also turned back congressional challenges to Project Apollo, the Space Shuttle program, and the various iterations of the NASA space station.

Not all of the presidential victories, however, cast the chief executive in the advantageous role of advocating new ideas while placing Congress in the stingy position of saying no. In 1970 President Nixon asked Congress to cut NASA's budget to $3.4 billion, a significant reduction from the $5 billion budgets that NASA had enjoyed during the mid-1960s. Space boosters pulled a classic end run, convincing members of the House of Representatives to authorize a $300 million increase in the human space flight budget.[13] The president's plan ultimately prevailed, however, as Senators and conferees later removed most of the increase.

Presidential prevalence has not come without struggle. During the 1970s presidents proposed and won approval for a series of large science projects: the Hubble Space Telescope, the Pioneer Venus probe, and the Galileo probe to Jupiter. All three programs faced strong opposition centered in the House appropriations committee handling NASA affairs. In 1974, following the recommendation of appropriations subcommittee chair Edward Boland of Massachusetts, the full House of Representatives deleted funds for the Hubble Space Telescope. After the Senate restored the telescope funds, the House of Representatives in 1975 deleted most of the funds for the Pioneer Venus orbiter and hard lander on the grounds that NASA should not undertake two big

science projects at once. Again, the Senate restored the funds. In 1977 the House deleted funds to start the Galileo probe during the initial consideration of the NASA appropriation bill. Following conference committee negotiations with the Senate, Boland asked for and lost a vote of support from the whole House of Representatives. In a stunning reversal for chairman Boland, the House voted 131 to 280 to support the president's position in favor of the probe.[14]

Even the sacrosanct Project Mercury received its share of congressional opposition once Eisenhower approved it. Edward Boland, then an four-term Congressman, objected to a Republican effort to add extra funds to the NASA research and development budget on the grounds that the newly-created space agency had already received more money than it could wisely spend. The representatives voted to support the president's position by a margin of two-to-one.

The notion that presidents can prevail on space policy simply by making a strong public statement committing the nation to a specific "big-ticket" goal is not supported by the historical record. Not even the rhetoric of President Kennedy's Apollo decision stood up to the pressures of later years. The events of 1963 bear this out. Two years after Kennedy challenged the nation to race to the Moon, he undercut his rationale for the adventure by proposing in a September 1963 speech at the United Nations that the Soviet Union join the U.S. in completing the voyage. Representative Thomas Pelly, a Seattle Republican, stood

up in the well of the House of Representatives three weeks later and offered an amendment to prohibit the use of government funds to finance a joint expedition. In spite of Kennedy's insistence that his U.N. proposal merely carried out the mandate for international cooperation in NASA's enabling legislation, the amendment passed.[15]

Buoyed by the thought that the United States and Soviet Union were no longer racing to the Moon, opponents of Project Apollo moved to cut funds for what one called "a manned junket to the moon." The House of Representatives began the assault by removing $600 million from President Kennedy's $5.7 billion NASA budget request. The administration appealed to the Senate, arguing that nothing less than $5.4 billion would keep Project Apollo on schedule. Rather than receiving sympathy, the Kennedy administration faced new levels of hostility. Arkansas Senator J. William Fulbright moved to cut 10 percent more from the NASA appropriation. The president's allies prevailed on that vote, but failed to sustain a Senate Appropriations Committee recommendation to add $90 million to the House figure when Senator William Proxmire successfully moved to strike that amount. Proxmire's victory of 40 to 39 votes clearly marked an end to Kennedy's ability to charm the Congress with his visions of space exploration.[16] President Kennedy's 1961 speech initiating Project Apollo may have been a special moment, but it by no means created a form of magic whose rituals guaranteed future success.

Since then, as John Logsdon points out in the first chapter of this book, the president has continued to be the primary determinant "of the content and pace of the civilian space program." The president, however, wields that power within a sophisticated structure of opportunities and constraints. Many factors tug at the loyalties of people outside of the White House, of which loyalty to the president is only one. The debate over the future of the NASA space station between 1991 and 1993 reveals precisely how much of a difference presidential leadership can make.

In 1991, after having begrudgingly approved six years worth of development funds for the space station, the House appropriations subcommittee handling NASA's budget voted to kill the controversial project. Administration officials appealed the decision to the whole House. They lobbied hard to have the larger assembly reverse the committee recommendation, always a difficult task in a legislative body given to committee deference. President George H.W. Bush and Vice President Dan Quayle personally joined the effort, contacting members from key districts. Heavy lobbying produced a 240-173 space station resurrection on the House floor. The issue resurfaced again in 1992. This time appropriations subcommittee chair Bob Traxler of Michigan forced an up-or-down vote on the space station on the House floor. Another round of intense lobbying followed, and the administration position prevailed by a vote of 237 to 181.[17]

NASA officials believed that the issue was behind them, but

redistricting and the 1992 election produced a large class of freshmen legislators who had never voted for the controversial project. Skepticism about the cost and value of the space station enlarged the opposition and threatened the project anew.

Again, the president supported the project. It was a scaled-down project and a new president (Bill Clinton), but presidential support nonetheless. Most of the old members of the House who had voted on the issue through the two previous challenges did not change their positions. Some did, however. An analysis of their behavior provides insights into the extent of presidential influence.

Twelve Republicans who had voted "yes" for the space station under President Bush voted "nay" under President Clinton. It may be surmised that they never possessed a great deal of enthusiasm for the project, but voted for it out of deference to the president. Once Bush was gone, however, their support disappeared.

Thirteen Democrats changed their votes in the opposite direction. They had opposed the space station in 1991 and 1992. With their own president in the White House, they supported the project. The most dramatic switch was provided by Louis Stokes, an Ohio Democrat and the new chairman of the House appropriations subcommittee handling the bill. In 1991 and 1992, as a majority member on the House appropriations subcommittee, he had voted to kill the space station. Motivated in part by a desire to please President Clinton, Stokes supported the space station in 1993.

Twelve votes lost and thirteen found produced a net gain of one vote for presidential leadership. That is not much in a body with 435 members (plus five delegates who can vote on floor amendments). The shifts nearly canceled out each other. Given the fact that the space station survived the 1993 challenge by a single vote (215 to 216, including the delegates), small shifts provided space station supporters with all they needed to prevail. In that sense, presidential leadership made an important contribution.[18]

Taken as a whole, the history of civilian space policy provides little support for the doctrine of presidential omnipotence. Presidential leadership does make a difference, although that difference is marginal. Presidents prevail most, though not all of the time. Presidential success in space policy is not remarkably different from presidential success with Congress on all policy. The notion that presidential leadership in space somehow provides the chief executive with special opportunities for success is not supported by the whole record.

The President and the Loss of the Space Exploration Initiative

While presidents have played the dominant role in setting the national space agenda, leading the nation toward that agenda has been a constant struggle. The limits of presidential leadership in the U.S. space program and the factors that shape the president's ability to lead have been very real, and made all the more prescient because of the success of the lunar landing in 1969. The Apollo episode suggested to many people associated

with the U.S. space program that once a president committed the nation to a specific objective and placed the power of the Executive Office behind it, the initiative would move forward. This belief gained added credibility as subsequent presidents were able to overcome early opposition to the next two human space flight initiatives--the Space Shuttle program and the Freedom Space Station.[19]

This view is not historically valid. The most dramatic exception to the record of presidential preeminence occurred in July 1989 when President George Bush proposed an ambitious Space Exploration Initiative (SEI) that would return Americans to the Moon, establish a lunar base, and, then, using a NASA-built space station, send human expeditions to the planet Mars. In advancing SEI, Bush followed the classic script for exercising leadership in space. He made a Kennedy-like announcement, complete with a strong personal commitment, proposing the initiative during a major address commemorating the twentieth anniversary of the first landing on the Moon delivered from the steps of the National Air and Space Museum with the Apollo 11 astronauts at his side. Like Kennedy some thirty years earlier, Bush subsequently elaborated on his proposal in a speech at a Texas university. (Kennedy spoke at Rice University; Bush chose Texas A&M). Having set a specific objective, with added deadlines, Bush instructed his National Space Council to marshall the power of the Executive Office behind the proposal.

While Bush had announced, à la Kennedy's Apollo decision, a

dramatic space exploration project, the similarities between those two presidential initiatives began and ended with the public declarations. Whereas broad national support was present in 1961 for the Apollo decision--support that was continually nurtured by senior officials at NASA and in other sectors of the government--a consensus in favor of the Bush program was tenuous at best and could not be properly maintained during the years that followed. As a result, unlike Project Apollo, the Space Exploration Initiative died a quiet death on Capitol Hill.[20]

The public and congressional reaction was lukewarm from the beginning, especially when budget estimates for the overall endeavor began flowing in. Representative Leon Panetta criticized Bush for "talking promises . . . without any regard to the fiscal consequences."[21] The Washington Post observed that "easy slogans are not going to conquer the high hurdles of politics. This is not 20 years ago, when the ringing words of a president could spark a commitment of some 4 percent of the U.S. budget toward a trip to the moon by a certain date."[22]

Representative Bob Traxler and Senator Barbara Mikulski, chairs of the House and Senate Appropriations subcommittees that acted on the NASA budget, immediately cut most of the funds that Bush had requested for starting the initiative. Normally strong supporters of the civilian space program, they directed NASA to focus its attention on projects already approved. In the following year, funding for SEI was virtually zeroed out of the budget despite lobbying from Vice President Dan Quayle, head of

the president's National Space Council. Although Bush castigated Congress for not "investing in America's future," members decided to spend the funds elsewhere. "We're essentially not doing Moon-Mars," Mikulski bluntly declared.[23] As a result the Space Exploration Initiative disappeared after receiving consideration in congressional committee.

The President and Other Space Policy Losses

While the Space Exploration Initiative provides a spectacular illustration of the limits of presidential leadership in space, it is not the only example. During the period when NASA struggled to complete Project Apollo, Congress altered or terminated three major presidential initiatives. The first of these was Project Voyager, a presidentially supported soft-landing mission to Mars. Based on a recommendation from the National Academy of Sciences, NASA officials formulated and won presidential approval for $2 billion to launch a pair of orbiter-landers on one Saturn V on a mission to explore the Red Planet. Even with the endorsement of the Johnson administration, Voyager was controversial almost from the start. A few scientists supported the mission but many opposed it as technically ambitious, exceptionally risky, and overly expensive. In the summer of 1967, following conflicting testimony from scientists and short of funds for other priorities like the Vietnam war, Congress denied the money necessary to start up the project.[24]

NASA leaders and their scientific clientele learned, at

least temporarily, several hard lessons from the Voyager failure. Most important, they realized that strife within the scientific community had to be kept internal in order to put forward a united front against the priorities of other interest groups and other government leaders. While imposing support from the scientific community could not guarantee that any initiative would become a political reality, without it a program could not be funded. They also learned that while a $750 million program found little political opposition at any level, a $2 billion project crossed an ill-defined but very real threshold triggering intense competition for those dollars. Finally, they learned that presidential sympathy for a "big science" project was no guarantee of congressional support. Having learned these lessons, as well as some more subtle ones, the space science community regrouped and returned with a trimmed-down Mars lander program, called Viking, that was funded and provided good scientific return in the mid-1970s.[25]

Also during 1967 Congress sharply reduced funds for the Apollo Applications Program, a series of undertakings designed to keep the United States in space after the flights to the Moon. President Lyndon Johnson, under pressure to fund the Vietnam War and a variety of Great Society programs, submitted a scaled back NASA budget that contained $454 million for Apollo Applications. At the heart of this initiative was a modest orbital workship, later named Skylab, that could be tended by astronauts. It would be, NASA officials hoped, the precursor of a real space station.

Congress allowed NASA to spend only $300 million, essentially dismantling the program schedule. NASA later realized some success with the program in 1973 as three human spaceflight missions were flown on Skylab.[26]

Finally, in 1971 Congress cut President Richard M. Nixon's request to fund a series of spacecraft that would undertake a "Grand Tour" of the outer planets of the solar system. Nixon's 1971 budget request included $30 million to start up this $1 billion program. Congress appropriated only enough money to allow NASA to study other alternatives.[27] Over the objections of NASA Administrator James C. Fletcher, Nixon's staff resubmitted a much slimmed-down program the following year as a two planet mission to Jupiter and Saturn called Project Voyager. At the time, this was viewed as a major political defeat for space scientists, overcome only when NASA technology produced a spacecraft that far exceeded its design specifications and flew on to Uranus and Neptune.[28]

Partisanship and Space

Other forces beyond presidential leadership, of course, work to affect the overall level of support for space policy. Ideology is the most important of these. Partisanship and "pork barrel" politics also play a more limited but nonetheless significant role. This is because for much of its history, space has not been a deeply partisan issue. Once in the White House, both Democrat and Republican presidents have become advocates for space. Both Democrat and Republican presidents have chosen to

restrain it. In Congress, space boosters have relied upon allies within both political parties to fight for new initiatives and rescue old ones. Opponents as well can be found on both sides of the aisle. The presence of bipartisan support should not be taken as a sign that space policy is somehow above politics, however, or that it enjoys a special immunity from the level of partisanship that affects other endeavors. In fact, space policy tends to mirror the ebb and flow of partisan divisions within the political system at large.

When the space age began with the launching of Sputnik I in 1957, partisan differences emerged. Democrats in Congress seized upon the space issue, as David Callahan and Fred Greenstein point out in the second chapter of this book, to underscore "a broader failure by Eisenhower and other Republican leaders to provide sound national leadership." Democratic leaders complained about Eisenhower's "beginner" space program and threatened direct action if the leaders of the newly created National Aeronautics and Space Administration did not show "proper imagination and drive."[29]

The launch of Sputnik I by the Soviets in 1957 allowed the opposition party to question Eisenhower's executive abilities as the Democrats put forth an image of the president as a smiling incompetent. G. Mennen Williams, the Democratic governor of Michigan, even released a poem linking Eisenhower's inaction to his well-known fondness for golf.

Oh little Sputnik, flying high

With made-in-Moscow beep,
You tell the world it's a Commie sky
and Uncle Sam's asleep.
You say on fairway and on rough
The Kremlin knows it all,
We hope our golfer knows enough
To get us on the ball.[30]

Democratic Senator and presidential contender Lyndon B. Johnson used hearings by a subcommittee of the Senate Armed Services Committee beginning on November 25, 1957, to embarrass the president and the Republican Party. In 1960 John F. Kennedy ran for the presidency with Johnson as his running mate in a campaign that charged the Republican Eisenhower as a "do nothing" president. Kennedy was especially hard on Eisenhower's record in international affairs, exposing the so-called "missile gap" with the Soviet Union as an example of Eisenhower's inattentiveness (a charge that later turned out to be false).[31]

Republicans returned fire on the Kennedy administration during the early 1960s. Ex-president Eisenhower questioned the wisdom of spending more than $20 billion on what he called "a mad effort to win a stunt race" to the Moon.

Why the great hurry to get to the moon and the planets? We have already demonstrated that in everything except the power of our booster rockets we are leading the world in scientific space exploration. From here on, I think we should proceed in a orderly, scientific way,

building one accomplishment on another.[32]

In a later article titled "Why I Am a Republican," Eisehower argued that the Moon race "has diverted a disproportionate share of our brain-power and research facilities from equally significant problems, including education and automation."[33]

Eisenhower's NASA administrator, T. Keith Glennan, provided substance for the party line. Corresponding with members of the Eisenhower administration, he expressed misgivings about the commitment to race the Soviets to the Moon.[34] He told Eisenhower, then in retirement at Gettysburg, Pennsylvania, that "this is a very bad move. . . . We are entering into a competition which will be exceedingly costly and which will take up an increasingly large share of that small portion of the nation's budget which might be called controllable."[35]

Responding to this party line, Republicans forced Democratic Party law-makers to defend Project Apollo against other priorities. In 1963, Representative Louis Wyman moved to cut $200 million from the NASA research and development budget. Wyman, a New Hampshire Republican, argued that the U.S. could not afford a crash program to reach the Moon when defense needs pressed harder. His motion was defeated in a rare party line vote on space, with 90 percent of the Democrats supporting Project Apollo and 89 percent of the Republicans supporting the change.[36]

Four years later the space program faced a similar challenge. Senator William Proxmire moved to cut $361 million

from NASA's overall authorization. This time a bipartisan coalition of Republicans and Democrats joined together to turn back the assault. Fifty-eight percent of the Democrats and 61 percent of the Republicans present voted to deny Proxmire's request.[37] This was followed by roll call votes during the 1970s in which a similar bi-partisan coalition of Democrats and Republicans voted to start up projects like the Space Shuttle and Project Galileo. The votes suggested that space policy had reached a level of political maturity wherein it enjoyed support from both political parties. This notion is somewhat disingenuous.

While it is true that space exploration enjoyed bipartisan support during that period, it would be premature to conclude from instances such as these that space policy enjoyed a status above politics. The decline in party line votes over space policy to a certain degree reflected the decline in party line votes generally. Between 1961 and 1976 the proportion of party line votes (in which a majority of Democrats opposed a majority of Republicans) fell from 50 to 36 percent in the House of Representatives and from 62 to 37 percent in the Senate.[38] This continued a trend that had been underway for more than 100 years. Partisanship on Capitol Hill has been in gradual free fall since the late 1800s, when roughly three out of four votes in the House of Representatives pitted a majority of one party against the other.[39] Given the declining importance of partisanship in the national government overall, it should not be surprising to find

so few party line votes over space policy in the late 1960s and 1970s.

The tradition of bipartisan support (and opposition) continued into the 1980s. When President Ronald Reagan proposed in 1984 that the United States start work on a permanently occupied space station, for example, he found himself both supported and opposed by Republicans and Democrats. Congressman Bill Green, a Republican representative from central Manhattan, helped lead the opposition to the project on the House appropriations subcommittee handling the money bill. Senator Jake Garn, a Utah Republican who flew on the Space Shuttle in 1985, gave the White House fits with his calls for automation on what NASA had promised would be a fully manned facility. Space station supporters had to rely upon a coalition of junior members (both Democrats and Republicans) to move the money bill out of the House appropriations subcommittee where Bill Green and subcommittee chair Edward Boland would have happily disapproved it.

As the space station program encountered further difficulties, partisan differences reappeared. The project, troubled by growing costs and missed deadlines, became more closely associated with the Republican administration that had nurtured it through various crises. It consequently lost support among House and Senate Democrats. In 1988 Republican law-makers mobilized to defeat an effort to remove $400 million from the NASA budget. House Republicans mobilized 77 percent of their

members to defeat the motion. The Senate followed in 1991. A move by Arkansas Democrat Dale Bumpers to gut the space station program won a ten vote majority (32 to 24) among Senate Democrats. Republican Senators supported the space station by a margin of 40 to 3 in order to maintain the program.

By the latter part of the 1980s, partisanship had reemerged in the politics of space exploration. Five of the six most important votes that civilian space boosters faced on Capitol Hill between 1988 and 1992 found a majority of Democrats opposing a majority of Republicans. In 1993 the space station issue again came before the Congress, with the key vote taking place in the House of Representatives. Once again, a majority of Republicans opposed a majority of the Democrats. The Republicans, moreover, found themselves in the unusual position of supporting Democratic president Bill Clinton, whose position in favor of the project was opposed by three-fifths of the members of his own party.

The revival of partisan differences over space policy followed a larger trend toward increased partisanship over all manner of issues. All told, the number of roll call votes in which party opposed party (a majority of each) rose from 36 percent in 1976 to 64 percent in 1992 on the floor of the House of Representatives. Senate partisanship increased in a similar manner.[40] The growth in partisanship was associated with an increase in the ideological shrillness of American politics.[41]

Space policy has not enjoyed a charmed existence, immune from the residual level of partisanship affecting the national

government as a whole. It has, to be sure, enjoyed a measure of bipartisan support, especially from the late 1960s through the 1970s. At the same time, party considerations have fundamentally affected the course of the space program in various ways. Party affiliation is not a strong predictor of positions on space, but neither is it irrelevant. Partisan differences over space have moved through cycles more or less like those cycles affecting government in general. The idea that presidential leadership somehow allows the space program to sit on a plateau above partisan differences is simply not supported by the historical record.

Political Ideology and the Politics of the Space Program

If the issue of space is not special, and if presidential leadership is of no greater consequence in it than elsewhere, then what is? What has motivated politicians and other leaders to either embrace or reject space exploration. Historically, two major factors have shaped the space policy debate in American politics: ideology and the pragmatism of the government contract. Ideological perspectives on the value of a strong space program have undergone a major shift since the space age began. Contracting issues (space as a "pork barrel" from which government funds are distributed) has helped to create support for the space program in areas of traditional ideological opposition.[42]

From the beginning of the space age in 1957 the ideological debate over the program has revolved around the expense and

direction of the enterprise, particularly the emphasis to be placed on human space flight initiatives as opposed to scientific objectives. In the 1950s, politically conservative leaders--many of whom were members of the Republican Party--favored a modest, scientifically-based space program. The standard bearer for this conservative approach was President Dwight Eisenhower, whose preoccupation with the need to conduct survelliance flights over the Soviet Union shaped much of his attitude toward space.[43]

Eisenhower supported an extensive program of reconnaissance satellites as a means of learning about potentially aggressive actions by the Soviet Union. The safety from surprise attack promised by reconnaissance satellites was an especially attractive feature for Eisenhower and leaders of his generation because they remembered well the Japanese attack at Pearl Harbor on December 7, 1941, and were committed to never fall for such a sucker punch again. At a meeting of key scientific advisors on March 27, 1954, to discuss the use of space for military purposes, Eisenhower warned that "Modern weapons had made it easier for a hostile nation with a closed society to plan an attack in secrecy and thus gain an advantage denied to the nation with an open society." The earlier use of aircraft overflights had been compromised in 1960 when the Soviet Union shot down an American U-2 spy plane piloted by Gary Francis Powers. Reconnaissance satellites offered a more reliable substitute for the more dangerous aircraft overflights. Even the U.S. scientific satellite program for International Geophysical Year

involvement, Project Vanguard, was viewed in large part by the Eisenhower administration as a cold war measure. By linking the first satellite launch to an international scientific effort, Eisenhower could establish the principle of overflight, namely that a satellite orbiting over enemy territory did not constitute a hostile act. Establishing the principle of peaceful overflight was a key reason behind Eisenhower's desire to move scientific research in space out of the military and into a civilian agency.[44]

Following this logic, conservatives favored a civilian space program with clear scientific objectives whose expenses were modest enough to not distract from more important national security needs. Even the proposed "man in space" program was viewed in conservative circles not as an exploration program, but as a means to test the effect of radiation and weightlessness on human beings who might be called upon to orbit the earth.[45]

This conservative approach toward space exploration dominated U.S. policy making until the Soviet launch of Sputnik 1 on October 4, 1957. Suddenly, Eisenhower awoke to intense criticism. His critics ballyhooed the illusion of a technology gap and demanded increased spending for aerospace endeavors, technical education, and new federal agencies. The call for an aggressive space program by liberal Democrats, in contrast to a more parsimonious effort by the conservative Republicans led to the longstanding conclusion that those ideologically conservative favored a small, diffident space program while those with liberal

perspectives advocated a much more forceful and dynamic effort.[46]

Indeed, liberal Democrats pushed hard for an aggressive human space flight program with large federal expenditures presided over by a huge federal presence (NASA). From the outset they demanded that sufficient funds be appropriated to ensure national prestige in the international arena, something that conservatives eschewed. T. Keith Glennan, NASA's first administrator, argued against entering into a "space race" with the Soviet Union in a letter to his successor, James Webb.

> There can be only one real reason for such a "race". That reason must be "prestige". The present program without such a "race" but with full intention of accomplishing whatever needs to be accomplished . . . will produce most of the significant technology and essentially all of the scientific knowledge that will be produced under the impetus of the "race" and at the lower cost in men and money . . .
>
> I don't think we should play the game according to the rules laid down by our adversary. I do believe that such prestige is apt to be less than enduring as compared to the respect and friendship we will gain from foreign aid programs, well administered over the same six or eight years.[47]

The liberal wing of the Democratic party pressed to engage the Soviet Union in such a race, and President Kennedy's decision to undertake Project Apollo accomplished just that. In 1963, in an effort that repeated much of the conservative line, Arkansas

Senator J. William Fulbright moved to strike $519 million from the NASA budget.[48] Republicans and southern Democrats, the groups among which most conservatives could be found, split evenly on the issue. Northern Democrats rescued the program. The northern Democrats voting to rescue the NASA space program read like a who's who of American liberalism: Kennedy of Massachusetts, Humphrey and McCarthy of Minnesota, Muskie of Maine, Magnuson of Washington, and Ribicoff of Connecticut.

By 1967 the ideological divisions had begun to change. A similar motion by Senator William Proxmire now found northern Democrats divided on the wisdom of NASA spending, with the more conservative Republicans and southern Democrats coming to its rescue.[49] The conversion completed itself with the election of Richard Nixon to the White House in 1969. Shortly after his inauguration, Nixon received recommendations regarding the future of the U.S. space program beyond the flights to the Moon. Space boosters, led by NASA partisans, urged Nixon to continue the levels of spending attained during the Apollo years. As leader of the party that had initially opposed the race to the Moon, Nixon could have wound down the manned space program in favor of a more conservative program of research.[50] Instead, following a contentious White House debate, Nixon and his aides decided to continue a modest space flight program by approving construction of the NASA Space Shuttle. Caspar W. Weinberger, deputy director of the president's Office of Management and Budget (OMB), explained why the White House overcame conservative inhibitions

in terms that recalled Kennedy's original rationale.

> This was the next frontier, and it [the Space Shuttle] was the one thing that would enable us to achieve a very substantial direct return from the huge investment in space. To me, it would have been all right to invest the amount necessary to go to the moon, simply because of the fact that it was a terribly important thing for America to do. . . . It seemed to me that we could either grasp it [the shuttle technology], or fall irretrievably behind, and it was something that therefore we should do.[51]

John Erlichman, the president's senior advisor on domestic affairs, listed a second reason for the president's approval of the program that appealed to conservative ideals. "He liked heroes," Erlichman recalled. Nixon viewed the astronauts as embodiments of traditional American ideals and did not want to be the president who removed them from the national scene.

> He thought it was good for this country to have heroes. The country didn't have very many heroes. But he had a whole lot of heroes as a boy, and he was a reader of history. I think that was part of it, too. He had this kind of metaphysical thing about national morality, national fiber, and national ideals, which he would spin out; and . . . he would sit and just sort of ruminate on these things--drugs and decline of American moral fiber and all of that, [which] somehow or another had to be dealt with by the President.[52]

Conservative support for the Space Shuttle within the Nixon

administration was further advanced by the national security applications of shuttle technology. The Department of Defense planned to use the shuttle to launch U.S. reconaissance and communication satellites on short notice. John Erlichman even thought that the shuttle might be used to capture enemy satellites.[53] President Nixon was very impressed with the shuttle's potential for military missions and emphasized this outlook in support the project. The support of Robert C. Seamans and the Department of Defense for the national security use of the shuttle helped to make the program more palatable to conservatives.[54]

As conservative support shifted toward the space program, liberal support shifted away. Minnesota Senator Walter Mondale introduced an amendment in 1972 to delete all funding for the Space Shuttle. In 1973, then-Representative Ed Koch of New York complained about space exploration in general. "I just for the life of me can't see voting for monies to find out whether or not there is some microbe on Mars, when in fact I know there are rats in the Harlem apartments."[55] Even those who supported the space program expressed misgivings about excessive spending, a traditionally conservative concern. As Representative George E. Brown, Jr., Democrat from California, noted in 1992 "that some of our proudest achievements in the space program have been accomplished within a stagnant, no growth budget." He applauded the science programs of the 1970s "when the NASA budget was flat. It would be wise to review how we set priorities and managed

programs during this productive time."[56]

This see change in ideological attitudes toward space went considerably beyond the happenstance of presidential control. It drew its strength from the confluence of two broad forces in American political thought: the changing nature of American liberalism and the conservative embrace of frontier myth.

Conservative politicians became the bearers of the frontier mythology increasingly used to justify the space program as the Cold War slipped away, while liberals grew increasingly restless with the exploitation and oppression that the frontier myth seemed to imply. Space constitutes a "new frontier" for conservative thinkers in that it allows them to envision the separation from a stagnant civilization, the struggle against a harsh environment, and the progress that (in their minds) inevitably follows.

Richard Nixon referred directly to these images on January 5, 1972, when he approved the Space Shuttle. He stated that the United States should build the system because it would "help transform the space frontier of the 1970s into familiar territory, easily accessible for human endeavor in the 1980s and '90s." He closed with a quote from Oliver Wendell Holmes about sailing into the unknown.[57] On January 25, 1984, President Ronald Reagan made similar references as he directed NASA to start work on a space station. "Our second great goal," he said, "is to build on America's pioneer spirit." He characterized space as "our next frontier" and called the station a means for

America to rekindle the advantages of past frontiering. "Just as the oceans opened up a new world for clipper ships and Yankee traders," he promised, "space holds enormous potential for commerce today."[58]

The linkage of the space program to traditional ideas about the frontier has been an important ingredient in the overall effort to build conservative support. The popular conception of "westering" and the settlement of the American continent by Europeans from the East has been a powerful metaphor for the propriety of space exploration and has enjoyed wide usage by conservative supporters. Its images of territorial discovery, exploration, colonization, and exploitation represent positive ideals for these people, if not for others.[59]

Liberals have come to view the space program from a quite different perspective. To the extent that space represents a new frontier, it conjures up images of commercial exploitation and the subjugation of oppressed peoples. Implemented through a large aerospace industry, it appears to create the sort of governmental-corporate complexes of which liberals are increasingly wary. Despite the promise that the shuttle like jet aircraft would make space flight accessable to the "common man," space travel remains the province of a favored few, perpetuating inequalities rather than leveling differences. Space exploration has remained largely a male frontier, with room for few minorities. In the eyes of liberals, space perpetuates the inequities that they have increasingly sought to abolish on

earth. As a consequence, it is not viewed favorably by those caught up in what political scientist Aaron Wildavsky has characterized as "the rise of radical egualitarianism."[60] The advent of this new liberal philosophy coincides with the shift in ideological positions on the U.S. space program in the late 1960s.

Writing from this new tradition, Western historian Patricia Nelson Limerick has argued that the frontier myth should not be employed as a happy metaphor by space boosters but as a pejorative reflection. The frontier metaphor, she argues, denotes conquest of place and peoples, exploitation without environmental concern, wastefulness, political corruption, executive misbehavior, shoddy construction, brutal labor relations, and financial inefficiency. Limerick feigned surpise that no one from NASA had punched the person employing the frontier analogy "for insulting the organization's honor. It's a wonder no one--no shuttle pilot, mission coordinator, mechanic, or technician--said, 'Now cut that out--we may have our problems, but it's nowhere near that bad'."[61]

The civilian space program began with moderate to conservative Republicans embracing a modest undertaking with scientific objectives. Moderate to liberal Democrats created a crash program supported by a robust aerospace industry. Conservatives found it easier to vote for space spending as the program matured, especially when industrial contracts were directed toward conservative strongholds in the South and West.

Liberals did not. By the 1980s the transformation was complete. Liberals in both parties found themselves opposing the big space program, while conservatives (increasingly concentrated in the Republican party) had become the bearers of the Kennedy appeal.

The Economic Imperative and Political Leadership in Space

Just as ideology has been important in shaping levels of support for the space program, so has the influence of government spending. The location of NASA field centers in ten different states helps spread support for the space program. NASA contracts out nearly 90 percent of its budget, further amplifying the economic impact of its activities. As numerous space boosters have observed, not one dollar has been spent in space. All of the money has been spent on the ground.

The location of NASA field centers has followed political necessity as well as technical requirements. T. Keith Glennan reported on a meeting that he had in 1959 with Albert Thomas, the Texas Democrat who chaired NASA's appropriations subcommittee. Thomas told Glennan that Rice University could provide 1,000 acres of land for a NASA installation south of Houston and urged Glennan to take it. Glennan hesitated, knowing that NASA intended to merge its human and satellite programs at the new Goddard Space Flight Center north of Washington, D.C. NASA had "other things to do, much more important than building buildings," he told Thomas. Thomas countered by explaining that Glennan would not get the money he needed for the Goddard facility unless he put one in Houston too. Thomas eventually got

what became the Johnson Space Center and the home of NASA's human space flight programs.[62]

Government contracts flowed out from NASA field centers both old and new. Rather than conduct the bulk of their work in-house, NASA officials contracted out between 80 and 90 percent of the funds they received. This was a deliberate strategy undertaken by NASA's first two administrators, Glennan and Webb, both to build up the capabilities of the American aerospace industry and to build a broad base of political support for the infant space program. For Glennan, and his ideologically sympathetic boss, President Eisenhower, reliance on the private sector came naturally. Glennan wrote that he came to NASA with "a firm conviction that our governmental operations were growing too large, [and] I was determined to avoid excessive additions to the Federal payroll." As a result he "was convinced that the major portion of our added funds must be spent with industry, education and other non-profit institutions." For Webb, the incredible magnitude of Project Apollo necessitated giving work to outside resources in order to accomplish the lunar landing within the decade as had been mandated by President Kennedy.[63]

By the mid-1960s, with the space program in full gear, NASA was directing over $4 billion per year to supporting organizations. More than 375,000 contract employees worked on NASA programs. Though widely distributed, the largest portion of funds went to contractors in sunbelt states that were just emerging economically. California, Louisiana, Alabama, Florida,

and Texas received the largest shares.[64] These states provided strong support for NASA as the program got underway. In the 1963 effort to cut $519 million from the NASA budget, not a single Senator from California, Louisiana, Alabama, Florida, or Texas supported the move. New York state also ranked high in the distribution of NASA contracts. Not surprisingly, neither of the New York senators voted to cut NASA's budget.

In his chapter on the Johnson years, Robert Dallek argues Lyndon Johnson promoted the idea that space expenditures could be used to stimulate the economies of the sunbelt states, particularly in the deep South. In that sense, space spending fit into Johnson's vision of the social transformation necessary to achieve his Great Society goals. More significantly, space contracts helped to soften conservative opposition to government largess. Tied as it was to Cold War politics and economic growth, space spending was an easier vote for conservative politicians to cast than a vote for welfare programs or civil rights. Fittingly, Johnson once remarked that the space program lay the groundwork for conservatives to accept Great Society welfare programs, since it created a precedent for big government spending.[65]

Government contracts played a central role in Nixon's decision to approve the Space Shuttle program. The U.S. aerospace industry had been hard hit by the wind-down of Project Apollo and the cancellation of U.S. participation in the effort to develop a supersonic transport. Another major defeat in the

government procurement could have meant negative consequences for Republicans running in the 1972 elections. Nixon was concerned about "battleground states" and his party's effort to break into the "solid South." Presidential adviser John Erlichman recalled that the list of "battleground states" was quite short but "when you look at employment numbers [for the aerospace industry], and you key them to the battleground states, the space program has an importance out of proportion to its budget." While the Space Shuttle would not generate many jobs relative to overall employment, it would help in regions where Nixon's political fortunes were in doubt. "You must not underemphasize that employment element," Erlichman said, "in Nixon's decision on the whole manned space program."[66]

As the space station issue moved to center stage, so did the implications of economic benefit. By 1992 the space station had created an estimated 75,000 jobs in more than half the U.S. states as NASA officials demonstrated in maps showing the distribution of space station spending.[67] Representative David Obey of Wisconsin, an opponent of the program, complained that "there is no bigger pork item in the domestic budget than this item." Speaking in support of continued funding, Texas Representative Tom DeLay argued that it is virtually impossible to "deprive your state and your constituents of this important source of jobs and revenue." Only two members of the 27-person Texas congressional delegation voted to discontinue the program. The space station received similarly strong support from Alabama

and southern California congressional districts, beneficiaries of significant space program largess. When the issue reached the Senate, Barbara Mikulski of Maryland gave it strong support. Chair of the appropriations subcommittee handling the NASA budget, she voted with liberals on most issues but not on the space station. The space station program, she argued would save jobs in the aerospace industry. "We are going to generate jobs today and jobs tomorrow," she argued, rebuffing efforts to cut the program from the federal budget. Mikulski expressed pride in the work of NASA's Goddard Space Flight Center, located in her home state, and certainly tracked that Maryland industries had received close to $18 million in space station contracts.[68]

As dramatic as the influence of contracting appears, it is not the primary force motivating congressional behavior in space. Ideology is the strongest predictor of congressional voting patterns. Especially in recent years, party affiliation is a close second. The influence of economic benefit is diluted considerably by the tendency of conservative law-makers to vote for the space program regardless of whether or not their constituents receive a great deal of funds from the NASA. The tendency to switch is most pronounced among legislative liberals, for whom economic benefit is a motivating force.[69]

Conclusion

Presidents exercise leadership in the U.S. space program within a complex web of ideological, partisan, and economic constraints. Other nuances too subtle to discuss here have also

moved individual political leaders to support or oppose presidential initiatives in space. Leadership is not easy, given these constraints, nor is success assured. The space program bears more of a relationship to other political issues than its adherents would like to admit.

Although the opportunities for presidential control are limited, the president continues to be the person who initiates the national space agenda. Before an initiative has any chance of political success, it must be endorsed by the president. The initiative may be modified substantially by the Congress, but it will not be considered to any great extent unless the president proposes it. No one but the president could have effectively initiated the race to the Moon in 1961, or the Space Shuttle program in 1972, or the space station and space exploration initiatives of the 1980s. Leadership had to emanate from the White House, even if other politicians disagreed. As such, the president has been and continues to be the crucial player in the effort to define the overall space program. Without the president, no large-scale project could be placed on the national political agenda.

Once proposed, however, any large space effort has to be nurtured through the political process. In the area of space technology, this takes place over many years. That process in Washington has never been particularly tidy, nor can it ever be in a pluralistic system. There may be fundamental agreement on overarching goals, such as the desire to participate in space

exploration, but specific means for achieving those goals are constantly reevaluated and altered.

This constant reevaluation gives rise to what some observers have characterized as "heterogeneous engineering," a situation in which technology and politics takes place simultaneously.[70] The image of presidential leadership created by Kennedy and Project Apollo is certainly attractive, but it does not abolish the general rule. Space policy takes place within a complex web of institutions and interests that makes NASA no more or less exceptional than other governmental activities.

Notes

1. See Arthur M. Schlesinger, The Imperial Presidency (New York: Houghton Mifflin, 1973).

2. Public Papers of the Presidents of the United States: John F. Kennedy, 1961 (Washington, DC: Government Printing Office, 1962), pp. 401-405.

3. John M. Logsdon, "An Apollo Perspective," Astronautics & Aeronautics, December 1979, pp. 112-17, quote from 115.

4. Jane Van Nimmen and Leonard C. Bruno with Robert L. Rosholt, NASA Historical Data Book, Volume 1, NASA Resources, 1958-1968 (Washington, DC: NASA SP-4012, 1988), pp. 137-141, 134, 63-119.

5. "Kennedy Boxscore," Congressional Quarterly Almanac 1961 (Washington, DC: Congressional Quarterly, 1962), pp. 91-102.

6. John Logsdon, The Decision to Go to the Moon: Project Apollo and the National Interest (Cambridge, MA: The MIT Press, 1970), p. 129.

7. See, for example, George M. Low, Team Leader, to Mr. Richard Fairbanks, Director, Transition Resources and Development Group, "Report of the NASA Transition Team," December 19, 1980, NASA Historical Reference Collection, NASA History Office, Washington, DC.

8. Hans Mark, The Space Station: A Personal Journey (Durham, NC: Duke University Press, 1987), p. 36. See also p. 50.

9. This has been demonstrated too many times to be seriously questioned. See Walter A. McDougall, . . . the Heavens and the Earth: A Political History of the Space Age (New York: Basic Books, 1985), pp. 141-235; Logsdon, The Decision to Go to the Moon; Harvey Brooks, "Motivations for the Space Program: Past and Future," in Allan A. Needell, ed., The First 25 Years in Space: A Symposium (Washington, DC: Smithsonian Institution Press, 1983), pp. 3-26; Rip Bulkeley, The Sputniks Crisis and Early United States Space Policy (Bloomington: Indiana University Press, 1991).

10. Robert A. Divine, "Lyndon B. Johnson and the Politics of Space," in Robert A. Divine, ed., The Johnson Years: Vietnam, the Environment, and Science, Vol. II (Lawrence: University Press of Kansas, 1987), pp. 217-253.

11. Congressional Quarterly Weekly Report, December 19, 1992, p. 3896; also see William J. Keefe, Congress and the American People (Englewood Cliffs, NJ: Prentice-Hall, 1988), chapter 4.

12. This took place on August 20, 1958. See Loyd S. Swenson, Jr., James M. Grimwood, and Charles C. Alexander, This New Ocean: A History of Project Mercury (Washington, DC: NASA SP-4201, 1966), pp. 101-106.

13. "Congress Authorizes $3.4 Billion for Space Agency," Congressional Quarterly Almanac 1970 (Washington, DC: Congressional Quarterly, 1971), p. 204.

14. On these programs see Bevan M. French and Stephen P. Maran, eds., A Meeting with the Universe: Science Discoveries from the Space Program (Washington, DC: NASA EP-177, 1981); Paul A. Hanle and Von Del Chamberlain, eds., Space Science Comes of Age: Perspectives in the History of the Space Sciences (Washington, DC: Smithsonia Institution Press, 1981); Joseph N. Tatarewicz, Space Technology and Planetary Astronomy (Bloomington: Indiana University Press, 1990); Robert W. Smith, The Space Telescope: A Study of NASA, Science, Technology, and Politics (New York: Cambridge University Press, 1989); and Karl Hufbauer, Exploring the Sun: Solar Science Since Galileo (Baltimore, MD: Johns Hopkins University Press, 1991).

15. "Major Legislation--Appropriations," Congressional Quarterly Almanac 1963 (Washington, DC: Congressional Quarterly, 1964), p. 170.

16. Ibid., p. 170.

17. Adam L. Gruen, "Deep Space Nein? The Troubled History of Space Station Freedom," Ad Astra, May/June 1993, pp. 18-23; Adam L. Gruen, "The Port Unknown: A History of the Space Station

Freedom Program," epilogue, unpublished manuscript, NASA Historical Reference Collection.

18. The following table summarizes the votes of continuing members of the House of Representatives who changed their votes on the space station appropriation bill between 1992 and 1993. A "no vote" indicates that the member switched his or her vote from yes to no; a "yes vote" indicates that the member switched from no to yes. In each case, a "no" was a vote in favor of the space station and the president's position. The result is statistically significant for a one-tailed test at the .05 level ($x2 = 2.9$).

	No	Yes	
Democrats	13	10	23
Republicans	5	12	17
	18	22	40

19. On these decisions see John M. Logsdon, "The Space Shuttle Program: A Policy Failure," Science, 232 (May 30, 1986): 1099-1105; John M. Logsdon, "The Decision to Develop the Space Shuttle," Space Policy, 2 (May 1986): 103-19; Howard E. McCurdy, The Space Station Decision: Incremental Politics and Technological Choice (Baltimore, MD: The Johns Hopkins University Press, 1990).

20. Thomas P. Stafford, et al., American at the Threshold: Report of the Synthesis Group on America's Space Exploration

Initiative (Washington, DC: Government Printing Office, n.d. [1991]; "Space Program Faces Costly, Clouded Future," Congressional Quarterly Weekly Report, April 5, 1986, p. 732; "NASA Cuts Slow Ambitious Plans," Congressional Quarterly Almanac 1990 (Washington, DC: Congressional Quarterly, 1991), p. 435; "Bush Goes on the Counterattack Against Mars Mission Critics," Congressional Quarterly Weekly Report, June 23, 1990, p. 1958.

21. Leon E. Panetta, "Who Will Pay for Bush's 'Vision'?" Washington Post, August 3, 1989, p. A27.

22. "Ticket to Space," Washington Post, July 23, 1989, p. D6.

23. "Bush Goes on the Counterattack Against Mars Mission Critics," Congressional Quarterly Weekly Report, June 23, 1990, p. 1958.

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27. David Rubashkin, "Who Killed Grand Tour?" unpublished student paper, April 30, 1993, The American University Department of History, copy in NASA Historical Reference Collection.

28. Mark Washburn, Distant Encounters (New York: Harcourt, Brace, Jovanavich, 1983); Linda Neuman Ezell, NASA Historical Data Book, Vol. III: Programs and Projects, 1969-1978 (Washington, DC: NASA SP-4012, 1988), pp. 221-28.

29. National Advisory Committee for Aeronautics to Dr. James R. Killian's Office, White House, August 6, 1958, NASA Historical Reference Collection.

30. G. Mennen Williams, quoted in William E. Burrows, Deep Black: Space Espionage and National Security (New York: Random House, 1987), pp. 94-95. See also Derek W. Elliott, "Finding an Appropriate Commitment: Space Policy Under Eisenhower and Kennedy," Ph.D. Diss., George Washington University, 1992.

31. T. Keith Glennan to President Dwight D. Eisenhower, December 28, 1960; President Dwight D. Eisenhower to T. Keith Glennan, December 29, 1960, both in NASA History Reference Collection; "NASA Post is Resigned by Glennan," Baltimore Sun, December 30, 1960.

32. Dwight D. Eisenhower, "Are We Headed In The Wrong Direction?" The Saturday Evening Post, August 11-August 18, 1962, p. 24.

33. Dwight D. Eisehower, "Why I Am a Republican," Saturday Evening Post (April 11, 1964), p. 19.

34. Richard E. Horner, Northrop Corp., to T. Keith Glennan, June 1, 1961; T. Keith Glennan to J.B. Lawrence Chair, International Fact Finding Inst., May 16, 1961; T. Keith Glennan to Richard M. Nixon, June 14, 1961; T. Keith Glennan to Dwight D. Eisenhower, June 14, 1961, November 13, 1961; T. Keith Glennan to George Kistiakowsky, December 4, 1961; T. Keith Glennan to James R. Killian, Jr., December 4, 1961, James R. Killian to T. Keith Glennan, December 19, 1961; T. Keith Glennan to Neil McElroy, September 22, 1961, all in Glennan Personal Papers, 19DD4, Archives, Case Western Reserve University, Cleveland, OH.

35. T. Keith Glennan to Dwight D. Eisenhower, May 31, 1961, Glennan Personal Papers, 19DD4.

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42. On these issues see Doris Kearns, Lyndon Johnson and the American Dream (New York: Harper and Row, 1976); Richard S. Kirkendall, The Global Power: The United States since 1941 (Boston: Allyn and Bacon, 1973); Christopher Lasch, The Culture of Narcissism: American Life in an Age of Diminishing Expectations (New York: W.W. Norton and Co., 1979); Bruce Miroff, Pragmatic Illusions: The Presidential Politics of John F. Kennedy (New York: David McKay Co., 1976); Linda R. Cohn and

Roger G. Noll, et al., The Technology Pork Barrel (Washington, DC: The Brookings Institution, 1991).

43. See R. Cargill Hall, "The Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," unpublished paper, NASA Historical Reference Collection; Robert A. Divine, The Sputnik Challenge (New York: Oxford University Press, 1993); Constance McLaughlin Green and Milton Lomask, Vanguard: A History (Washington, DC: Smithsonian Institution Press, 1971).

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46. See Bulkeley, The Sputniks Crisis and Early U.S. Space Policy.

47. T. Keith Glennan to James E. Webb, July 21, 1961, Glennan Personal Papers, 19DD4.

48. Congressional Quarterly Almanac 1963, p. 172.

49. The ideological shift bears up statistically. See John Low, "Economic Benefit, Ideology, and NASA Voting in the U.S. Senate," unpublished paper prepared for The American University, December 1991, supplemented by an analysis of House voting patterns.

50. In January 1970 Thomas O. Paine, Richard Nixon's appointee as the NASA administrator, described a somber meeting with the president in which Nixon told him that both public opinion polls and political advisors indicated that the mood of the country suggested hard cuts in the space and defense programs. Memo by Thomas O. Paine, "Meeting with the President, January 22, 1970," January 22, 1970, NASA Historical Reference Collection; Caspar W. Weinberger interview by John M. Logsdon, August 23, 1977, NASA Historical Reference Collection.

51. Caspar W. Weinberger interview by John M. Logsdon, August 23, 1977, NASA Historical Reference Collection.

52. John Erlichman interview by John M. Logsdon, May 6, 1983, NASA History Division Reference Collection. See also, George M. Low, NASA Deputy Administrator, James C. Fletcher, NASA Administrator, "Items of Interest," August 12, 1971; James C. Fletcher, NASA Administrator, to Jonathan Rose, Special Assistant to the President, November 22, 1971, both in NASA Historical Reference Collection.

53. John Erlichman interview by John M. Logsdon, May 6, 1983, NASA History Division Reference Collection.

54. Jacob E. Smart, NASA Assistant Administrator for DOD and Interagency Affairs, to James C. Fletcher, NASA Administrator, "Security Implications in National Space Program," December 1, 1971, with attachments, James C. Fletcher Papers, Special Collections, Marriott Library, University of Utah, Salt Lake City, UT; James C. Fletcher, NASA Administrator, to George M. Low, NASA Deputy Administrator, "Conversation with Al Haig," December 2, 1971, NASA Historical Reference Collection.

55. Quoted in Ken Hechler, Toward the Endless Frontier: History of the Committee on Science and Technology, 1959-79 (Washington, DC: U.S. House of Representatives, 1980), p. 274.

56. George D. Brown, Speech to National Academy of Sciences, February 26, 1992.

57. White House Press Secretary, "The White House, Statement by the President," January 5, 1972, Richard M. Nixon Presidential Files, NASA Historical Reference Collection.

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59. Frederick Jackson Turner developed the "Frontier Thesis" that guided inquiry into much of American history for a generation. It also continues to inform many popular images of the American West by traditional America. Turner outlined the major features of the subject in Frederick Jackson Turner, The Frontier in American History (New York: Holt, Rinehart, and Winston, 1920), which included the seminal 1893 essay, "The Significance of the Frontier in American History."

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61. Patricia Nelson Limerick, "The Final Frontier?" Wilson Quarterly, 14 (Summer 1990): 82-83, quote from p. 83. See also Richard Slotkin, Gunfighter Nation: The Myth of the Frontier in Twentieth-Century America (New York: Atheneum, 1992); Ray A. Williamson, "Outer Space as Frontier: Lessons for Today," Western Folklore, 46 (October 1987): 255-67; M. Jane Young, "'Pity the Indians of Outer Space': Native American Views of the Space Program," Western Folklore, 46 (October 1987): 269-79; Claire R. Farrer, "On Parables, Questions, and Predictions," Western Folklore, 46 (October 1987): 281-93; Stephen J. Pyne, "Space: A Third Great Age of Discovery," Space Policy, 4 (August 1988): 187-99. On the limitations of analogy in historical study see Bruce Mazlish, ed., The Railroad and the Space Program: An Exploration in Historical Analogy (Cambridge, MA: Harvard University Press, 1965); Richard E. Neustadt and Ernest R. May,

Thinking in Time: The Uses of History for Decision Makers (New York: The Free Press, 1986).

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64. NASA, Annual Procurement Report (fiscal year 1965), p. 40.

65. McDougall, . . . the Heavens and the Earth, pp. 322-23, 376, 389-96; John F. Kennedy to Lyndon B. Johnson, July 29, 1963; Johnson to Kennedy, July 31, 1963; Newton Minow Oral History, all in White House Famous Names, Lyndon Baines Johnson Library, Austin, TX.

66. Erlichman interview by Logsdon, May 6, 1983. This aspect of the issue was also brought home to Nixon by other factors such as letters and personal meetings. See Frank Kizis to Richard M. Nixon, March 12, 1971; Noble M. Melencamp, White House, to Frank Kizis, April 19, 1971, both in Record Ground 51, Series 69.1, Box 51-78-31, National Archives.

67. Space Station Freedom Media Handbook (Washington, DC: NASA, May 1992), p. 87.

68. "VA, HUD, Agencies' Plates Filled With Pork," Congressional Quarterly Almanac 1992 (Washington, DC: Congressional Quarterly, 1993), p. 643; "Freedom Thwarts Funding Foes; But Bigger War Ahead," Congressional Quarterly Weekly Report, May 2, 1992, p. 1157; "Freedom Fighters Win Again: Senate Keeps Space Station," Congressional Quarterly Weekly Report, September 12, 1992, p. 2722.

69. Low, "Economic Benefit, Ideology, and NASA Voting."

70. John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," pp. 111-34; and Donald MacKenzie, "Missile Accuracy: A Case Study in the Social Processes of Technological Change," pp. 195-222, both in Wiebe E. Bijker, Thomas P. Hughes, and Trevor J. Pinch, eds., The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology (Cambridge, MA: The MIT Press, 1987).

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