8-2015

Eclipsing Competition: Presidential Policy and NASA 1955-1979

Ryan Conway
Clemson University, rjconway2@gmail.com

ECLIPSING COMPETITION: PRESIDENTIAL POLICY AND NASA 1955-1979

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
History

---

by
Ryan J. Conway
August 2015

Accepted by:
Dr. Pamela Mack, Committee Chair
Dr. Richard Saunders Jr.
Dr. Steven Marks

ABSTRACT

The aim of this thesis is to analyze presidential decisions in formulating NASA programs in the first twenty years of the space administration. NASA programs varied greatly: from a "hands-off" approach taken by Eisenhower to a reactive role taken by the Kennedy and Johnson presidencies, as different presidents viewed Cold War competition in different lights. It also analyzes how competition and cooperation shaped NASA policy making. The thesis shows that NASA programs were extensions of the sitting president's foreign policy goals. Despite presidential rhetoric of cooperation with the Soviet Union, the programs of NASA from 1958-1969 relied upon competition to gain funding and support for its programs. After man landed on the Moon, NASA Administration attempted to distance the space administration from presidential control by proposing NASA's own future goals and programs. Ultimately, the attempt was for naught, as Richard Nixon and Henry Kissinger urged that NASA participate in a cooperative mission with the Soviet Union as a part of their détente foreign policy strategy. Even as the U.S. and the USSR worked together on a joint mission, competition continued to play a role in mission planning and coordination. Cooperation in space with the Soviet Union simply eclipsed competition. Old Cold War insecurities continued to play a role in the Soviet Union's ability to cooperate with the United States.

Many attempts at cooperation in space throughout the 1960's usually ended in Soviet non-committal, or refusal to cooperate until disarmament took place. By analyzing presidential speeches, private presidential conversations, NASA memorandum, and interviews with NASA personnel, this thesis shows how a number of factors: détente,

American agreement of nuclear disarmament, and the inability of the Soviet Union to land on the moon; combined to make a cooperative mission possible between the United States and the Soviet Union in the height of the Cold War. This research also shows that the collapse of détente also brought the end to U.S.-Soviet Union cooperation in space. The renewal of Cold War competition in the Carter and Reagan administrations made cooperation in space unlikely. Not until the Soviet Union collapsed did the United States and Russia make cooperation a fixture in space exploration.

ACKNOWLEDGMENTS

I thank my friends and family of course, first and foremost, for their support during this entire process, and their encouragement to finish. I would like to thank Dr. Kathleen Hilliard and Dr. Lawrence McDonnell getting me out of Iowa and into South Carolina. The former, whose red ink pen "bled" all over my paper as an undergraduate to advance my skills as a historian to continue to graduate school. To my committee members who suffered through countless drafts and did not give up on me. To Dr. Paul Anderson and Dr. Rod Andrew at Clemson University for their patience and answers to thousands of questions over two years. To Dr. Vernon Burton, the man whose work ethic surpasses that of a Midwestern farmer, who showed me what the life of an historian was like. Thank you to Dr. James T. Andrews at Iowa State University for sorting out the intricate details of the Soviet space program. Finally, to Dr. Alex Roland at Duke University; Colin Fries and Elizabeth Suckow at NASA Headquarters History Office; and Lauren Meyers at the University of Houston-Clear Lake for their assistance in gathering primary source materials.

TABLE OF CONTENTS

Page

INTRODUCTION

The National Aeronautics and Space Act of 1958, provided that the new National Aeronautics and Space Administration engage in a "program of international cooperation" pursuant to the foreign policy goals of the president. NASA was billed as a civilian agency complete with its own administration and was mandated as the sponsor of United States space and science activities. As a result, NASA programs from 1958 to the 1980's reflected Cold War attitudes of the sitting president. Created in the midst of the Cold War, NASA was designed as a tool of presidential foreign policy. During the Cold War, cooperation with the USSR in space was a talking point for U.S. presidents, but these words only materialized into one mission with little political, scientific, and technical gain. Despite a rhetoric of cooperation, Cold Warrior attitudes held sway as competition eclipsed cooperation in the U.S. space program.

Though cooperation with the USSR was nearly non-existent, the United States foray into space depended on cooperation with other nations around the globe. Tasked with building a worldwide tracking network, NASA officials created an international programs office, an administrative department with responsibilities similar to the U.S. State Department. The international programs office reflected a growing trend in the scientific community after World War II. Scientists gathered in international conferences to research and share results with the entire scientific community. To the public and these scientists, international cooperation was looked upon as a panacea to the economic and political woes of the world. Deputy Director of the International programs office, Arnold Frutkin, wrote in his 1967 book, *International Cooperation in Space*, that "a considerable amount of hope is vested in international cooperation," but offered cautiously that "collaboration and [national] excellence must be pursued

simultaneously." To Frutkin, there was not an "either-or" option between cooperation and competition.[1]

Rhetoric of cooperation played a significant role in United States presidential politics. Between 1955 and 1975, it was used by four different presidents during the twenty year period known as the Space Race. Each of the four presidents: Eisenhower, Kennedy, Johnson, and Nixon, defined cooperation in space differently. All four agreed on one area: that civilian space programs were "open," that is, made information and scientific findings available to all. Eisenhower understood cooperation as a country's freedom to gather intelligence to preserve national security without interference from others. Though Kennedy promoted competition at first to preserve national prestige,[2] he later turned to cooperation to combat the growing financial burden of a long term competitive program. Johnson believed cooperation to be an international understanding that every space-capable country agreed on the peaceful exploration. Lastly, Nixon identified cooperation as a tangible collaborative effort in which two or more countries significantly contributed to a single mission or project.

Though global cooperation was integral to NASA's success, the motivation for NASA's space activities was competition. As Frutkin wrote, "a clear duality dogs both the history and prospects of international partnership in the conquest of man's newest intellectual and technological frontier." On one side of this duality was "the strong appeal of world cooperation" and on the other was the implication of technological leadership and what it meant for "economic, political, and military security."[3] During the Space Race, the United States was embroiled in a Cold War against the USSR. The USSR boasted the world's only other significant space

[1] Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs, New Jersey: Prentice-Hall, 1965), 9.
[2] A concept that underscored scientific and technological superiority to determine the world's leader in the post-War era.
[3] Frutkin, 6-7.

program. Space milestones achieved by the Soviet Union challenged the United States' claim to technological superiority. "Firsts" in space were not only considered scientific endeavors: the use of high powered rockets, in most cases adapted from military missiles, demonstrated a country's military capability in a peaceful scenario. This correlation between rockets and strength meant that the Soviet Union had overcome a perceived technological gap and became a capable challenger to American military might. The development of rockets and missiles implied that in case of war, distance was no longer a factor. New missiles traveled hundreds of miles per minute, a launch could result in a devastating attack on an unaware country.

Beginning "firsts" by the Soviet Space program overshadowed the United States' slow and steady approach to space exploration. In the West, the United States' lack of space exploration milestones generated public outrage. Concerned citizens wrote letters to their local newspapers that proclaimed the Soviet Union surpassed the United States in new technology. The public feared that the technological gap was too wide for the United States to reclaim its identity as the world's leader. The Soviets successfully used these space milestones as a demonstration of socialist ideals. Space exploration exemplified the role that science and technology played in Cold War competition.

Fear began in the mid 1940's and continued into the late 1960's, that the United States and the USSR were liable to engage in all-out war. At times this conflict rolled into physical altercation, through proxy conflicts in Latin America and Southeast Asia, as the United States financially and materially equipped pro-Western forces against the Soviet-backed communist forces. By the end of the 1960's, new leaders in both the U.S. and USSR offered a new opportunity to improve international relations between the superpowers. This period, known as détente, was characterized largely by military concessions from the United States in an attempt to

crack open the otherwise secretive Soviet government. Détente as a foreign policy program emphasized the necessity for technical and cultural exchanges in areas where the two powers held common ground. In doing so, leaders hoped that tension would be eased in all Cold War arenas.

In the case of space, tangible cooperation with the Soviet Union was considered because it fit nicely into the technical-cultural exchange emphasized through détente. Coinciding with a change in presidential policy, the NASA administration wished to pursue programs on scientific merit rather than competition. As a result of détente, NASA, ultimately under the direction of Nixon and National Security Advisor Henry Kissinger, pursued a shift from competition in space exploration to cooperation in the participation in a joint mission with the Soviet Union. While such a mission offered few technical or scientific advantages, it helped NASA remain visible to the public between the end of the Apollo Moon missions, and its next ten year program, the Space Shuttle. More importantly, the cooperative venture was an opportunity to test détente.

In 1975, the US and USSR launched their Apollo and Soyuz capsules to attempt the first ever docking between two nation's spacecrafts. The mission was the culmination of three years technical planning, six years of negotiations, and is widely hailed as a cooperative effort to cap off an eighteen year competition between Cold War rivals for supremacy in space exploration. It came not as a technical marvel or even in some sense as a space milestone. Rather, the Apollo-Soyuz Test Project marked a change in Cold War foreign policy in which a cooperative project could be undertaken and common ground found between the United States and Soviet Union. Over the course of the project, it garnered mixed reactions from the media, public, and Congress. The foremost of these complaints was the "information disadvantage"—the United States had given away more information pertaining to NASA's management and technology than was received from the Soviet Union. Officials in NASA too had mixed reactions, but despite their

personal feelings, they carried out and completed the mission. Those who hailed the Apollo-Soyuz Test Project regarded it as an example of détente and an opportunity to further improve relations with the Soviet Union.

Despite the success of the mission, the United States and Soviet Union failed to collaborate on another significant project for nearly twenty five years. The failure to cooperate was the result as détente was abandoned and Cold War tensions increased once again. At the same time, NASA shifted focus toward a reusable spacecraft and the Soviet Union looked to orbital space stations as the future of space projects. As détente stalled by the late 1970's, the two superpowers sought neither cooperation nor competition but turned to a period of isolation. Coupled with the economic burden of a joint mission and lack of potential for major technical milestones, further full scale joint missions were viewed as wasteful in time, money, and technology. It is clear that for the United States, the major gain of the Apollo-Soyuz Test Project was the application of détente: a follow up mission would add little politically. For the Soviet Union, ASTP showcased that their space program was on par with NASA.

In order to understand the motivations of the United States and the Soviet Union to participate in a cooperative mission after nearly two decades of competition, chapters one and two look at the early American and Soviet space programs. The early Cold War (1945-1960) led each country to develop space programs under the guise of scientific achievement but served greater purpose as instruments to secure national defense and showcase military strength. Chapters one and two also analyze the Space Race, particularly the motivation of U.S. presidents to pursue crash programs that invested billions of dollars to send humans to the Moon. The escalation of the Space Race was largely reactive. Both the United States and Soviet Union worked to outdo the other after a major milestone was achieved. Until the mid-1960's, the United

States consistently lagged in this race. The lack of progress led to growing fear of inferiority to the technology of the Soviet Union. In the Soviet Union, every opportunity to beat the United States in space showcased their technological capability, enhanced their position as a world power, and lent credence to the Communist government. The underlying theme of the first two chapters focus is largely on competition during the Cold War.

The third chapter deals largely with the identity crisis that existed following the end of the Space Race. NASA's programs (and subsequent funding) were based upon beating the Russians to the Moon. After the "hangover" from the Apollo victory, NASA officials were left to conceive future space projects not justified solely on the basis of competition with the Soviet Union. NASA's administration wished to break free of presidential control by proposing its own goals for the future based on scientific merit. Congress and the executive seemed uninterested in space exploration unless it had some foreign policy implications. These two expectations of the space program were aligned when the idea of a cooperative mission was urged by the president and supported by NASA administration. The prospect of such a mission turned out to be a win-win-win: for the president, NASA, and the Soviet Union. By 1969, the USSR was unable to achieve the success of a lunar landing and therefore, scientific parity, with the United States. The prospective joint mission offered the Soviets a chance to showcase their technology after a series of failures in the late 1960's and early 1970's. This chapter examines the policy of détente and how it influenced the Apollo-Soyuz Test Project. It is during this short period of time that each country slowly became open to cooperation. The end of détente however, also coincided with the end of any other cooperative ventures. As the heads of government changed, so too did the direction of the space programs. Of course, underlying all of these themes is the story of Apollo-Soyuz. While no major technical advantages were gained, the greatest takeaway from the ASTP experience was cooperation at technical and personal levels. Relationships formed offered

invaluable experience for personnel on both sides. Those at NASA hoped that the cooperative experience would carry on into the future.

CHAPTER ONE

NATIONAL SECURITY AND THE BIRTH OF NASA

Science and technology applications during World War II fundamentally shifted the nation's conception of defense and security. The old adage: "to secure peace is to prepare for war" particularly applied to the governments of the United States (U.S.) and the Union of Soviet Socialist Republics (USSR). Advanced rocket and missile systems and the scramble to become a nuclear power put the ability to control science and technology at the forefront of world governments. The U.S. and Soviet Union worked rapidly to bolster their missile stores and quantity of atomic weapons. The United States had demonstrated their technological superiority as nuclear weapons were developed and used against the government of Japan. Strained relations between the World War II allies set the stage for a potential World War. In this atmosphere, rocket technology—converted missiles meant to leave Earth's atmosphere—was applied to scientific research. In doing so, a rocket launch showcased a nation's military ability without resorting to an attack upon another country. During the International Geophysical Year that took place between July 1957 and December 1958, the United States and USSR launched missiles into Earth's orbit to deliver satellite payloads. For the Soviet Union, it was not only a fear tactic but also a way to prove technological parity with the United States. To the United States, early space efforts supported both national defense and intelligence-gathering. In a six month period at the end of 1957, the Soviet Union's successes in orbiting two artificial satellites and the failure of the United States government to respond in turn, resulted in the creation of the National Aeronautics and Space Administration and set the course for a decade long competition known as the race for space.

The Space Race as a field of Cold War competition between the United States and the USSR started in earnest in the waning days of World War II. As Hitler's army withdrew to Berlin, they left behind German scientists who researched advanced weaponry, and their prototypes, scattered across Europe. The capture and, in some instances, the deliberate surrender of German scientists brought advanced missile and weapon technology to the Allied powers that followed on the heels of the Nazi regime. In large part, the Americans got the pick of the litter; they retained the highest revered scientist and "father" of the V-2 rocket, Wernher Von Braun, along with several other highly regarded experts.[4] The defeat of the Third Reich temporarily unified Europe but at the close of the war, the communist USSR hunkered down and sealed off territories under its control from the free western powers of the United States and Great Britain. The control of territories resulted in increasingly hostile discussions between the former Allies and led to a stalemate in diplomacy in war torn Europe. As the threat of war between the United States and Soviet Union loomed, some advanced weapon technologies were brought across the Atlantic Ocean with their German inventors, while others traveled across the continent into Russia.

In 1949, the Soviet Union performed its first successful test of a nuclear device. The successful test not only challenged the United States as the sole nuclear power, but also signaled the beginning of a race for military superiority, as the Soviets balanced the nuclear scale. Now that both sides had atomic weapons, the delivery systems for the weapons were the next focus for arms development. The first atomic bombs dropped on Japan were delivered via two converted

[4] Loyd S. Swenson, Jr., James M. Grimwood, and Charles G. Alexander, *This New Ocean: A History of Project Mercury* (1966; repr., Washington D.C.: National Aeronautics and Space Administration, 1998), 17-18; Asif Siddiqi, *Challenge to Apollo: The Soviet Union and the Space Race, 1945-1974* (Washington D.C.: National Aeronautics and Space Administration, 2000), 24; Boris Chertok was a guidance systems engineer and deputy to the chief designer of the Soviet space program who provides his account of the parceling of German technology at the end of World War II, see Chapter 17 of Boris Chertok, *Rockets and People, Vol. 1* (Washington D.C.: National Aeronautics and Space Administration, 2005) 239-270.

Boeing B-29 Superfortresses. Such an attack was risky because aircraft could easily be shot down before delivering their payloads. Coupled with the advancement of anti-aircraft implements and experimental jet technology that allowed planes to outfly and outmaneuver the hulking bombers, such a delivery system became obsolete. The answer to the delivery problem lay in an experimental technology developed by the Nazi army.

Rocket technology was in its infant stage by the beginning of World War II. A number of American, German, and Russian scientists were experimenting with liquid fueled rockets in the 1920's and 1930's. As the war broke out, German scientists, including doctoral student Wernher von Braun, were tapped by the Nazi government to develop a rocket as a war application. By 1950, the United States Army contracted with a team of German rockets scientists, including von Braun, to develop a long-range missile based on the V-2. Simultaneously, the Russians worked with German rank-and-file engineers and scientists who fed information to Soviet scientists.[5] Much of the Russian missile program was aided by the recovery of debris from exploded experimental V-2 rockets. The Soviet Union recovered detonated rocket parts to re-construct and troubleshoot the prototype German weapon. In contrast to the U.S. Army's openness to missile development and experimentation by German ex-patriots, the Russian bureaucracy proved to be divided on the use of German scientists. The United States' approach to the creation of a long range missile was open, German scientists were free to develop the weapon as they saw fit. The Soviets kept design and production of missiles in the hands of party members and native Russian scientists.[6] Experimentation with long-range ballistic missiles invigorated competition between

[5] Siddiqi, 26.
[6] Asif Siddiqi, *Challenge to Apollo*, Chapter 2, "First Steps" highlights the Soviet Union's approach to missile development with German scientists, as well as the Soviet insistence on using Soviet people to conduct experiments

the two countries over the next five years. The demand for superior military hardware heated up competition in the field of space exploration by the 1950's.

Concern for national security dictated early U.S. space policy.[7] Rapid Soviet achievements in rocket, long-range bomber, and atomic weapon technology baffled U.S. military, the state department, intelligence officials, and President Eisenhower. Today, historians debate whether the Soviet Union intended to expand communist influence into the West or used territorial conquest to secure its own borders. But at the time, military measures it took in expanding territory, along with reports of increased production of military hardware, were perceived as a direct threat to freedom in the United States and Western Europe. Lack of intelligence on Soviet military capability after World War II greatly compounded fears of an unforeseen attack against the United States. As president, Dwight Eisenhower acknowledged a correlation between military strength and the ability to exert political pressure internationally.[8] As a five star general, Eisenhower understood that reliable intelligence of the enemy's military capability was paramount.[9] Eisenhower looked to new technology to maintain military superiority of the United States and reveal the extent of Soviet arms production. Enlisting the aid of James R. Killian, president of MIT and later first science advisor to the president, a committee was established to advise the president on needed security measures.

Under the direction of Killian, civilian scientists and engineer members of the Scientific Advisory Committee of the Office of Defense Mobilization, members of the Rand Corporation, and various military officials, created the Technological Capabilities Panel (TCP) in July 1954. Over the next year, the panel focused on analyzing gaps in United States defense policy. By

[7] Roger Launius, "Eisenhower, Sputnik and the Creation of NASA: Technological Elites and Public Policy Agenda," *Prologue* 28, no. 2 (1996): 129.
[8] Walter McDougall, *…The Heavens and the Earth* (New York: Basic Books, 1985), 112-113, 413-414.
[9] James R. Killian Jr., *Sputnik, Scientists, and Eisenhower* (Cambridge: MIT Press, 1977), 80.

February 1955, the panel released a report to the National Security Council entitled *Meeting the Threat of Surprise Attack*.[10] The panel divided into three groups and each contributed their own section to the report. Projects One, Two, and Three addressed deficiencies in national security including: availability of military forces for a quick-response action, defense of the continental U.S., and intelligence gathering.[11] Without any hard facts on Soviet production of weapons, the panel foresaw that possibly that within a decade an attack by one or both sides on the other would result in "mutual destruction."[12] Although the panel stressed the superiority of an American offensive strike, it was predicted that within the decade, the Russians were capable of matching the U.S. weapon advantage in both size and number. To maintain military superiority, the panel recommended that short and long range intercontinental ballistic missile programs should operate under accelerated development. More importantly, to combat the lack of information on the Soviet Union missile program, the report detailed the need for the United States to engage in high altitude reconnaissance operations using both aerial photography and reconnaissance satellites.[13]

Following the panel's recommendations, Eisenhower adopted a twofold strategy to maintain an edge over the Soviet Union. The first used new advancements in aircraft and photograph technologies to carry out covert intelligence operations. These operations were intended to throw back the Soviet veil of secrecy. The second emphasized diplomacy and an overt request to use military hardware for the mutual benefit of both the United States and USSR.

---

[10] James Killian, chairman of the TCP, who was also asked later to become the first Science Advisor to the President, has an excellent memoir that describes his account of being on the panel. Killian, 67-93.
[11] R. Cargill Hall, "Origins of U.S. Space Policy: Eisenhower, Open Skies and Freedom of Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Vol. I: Organizing for Exploration, ed. John M. Logsdon (Washington D.C.: National Aeronautics and Space Administration, 1995) 218-219; Dino Brugioni, *Eyes in the Sky: Eisenhower, the CIA, and Cold War Aerial Espionage* (New York: Naval Institute Press, 2010), 94-95.
[12] Technological Capabilities Panel of the Science Advisory Committee, *Meeting the Threat of Surprise Attack* Washington D.C., February 14, 1955 <https://history.state.gov/historicaldocuments/frus1955-57v19/d9> (accessed April 21, 2014).
[13] Ibid.

These two methods exemplified the foremost concern of Eisenhower's presidency, national security.

To improve intelligence gathering, the CIA developed a high-altitude, unarmed, non-military aircraft to fly photo-reconnaissance over the USSR. The aircraft, later known as the U-2, designed by Lockheed aerodynamicist Clarence "Kelly" Johnson, was proposed initially to the Air Force and a group of civilian Pentagon officials in March 1954, as the TCP prepared to assemble.

While Assistant Secretary of the Air Force for Research and Development, Trevor Gardner, supported the aircraft design and purpose, Air Force brass rejected the proposal.[14] A month later, Gardner shopped the Lockheed proposal to Strategic Air Command General Curtis LeMay. General LeMay dismissed the planners from his office stating "the whole business was a waste of his time." Had he wanted an aircraft with photographing capabilities he would "put cameras in his B-36," nor was he "interested in a plane that had no wheels or guns."[15]

Determined to keep the project alive, Gardner met with the Central Intelligence Agency in May 1954, in the hope he could slip in a mention of Lockheed's new aircraft while the Air Force and CIA negotiated a separate joint high altitude operation over the Soviet Union. Gardner made special mention of the aircraft to Philip Strong, the Chief of Operations in the Office of Scientific Intelligence at the Pentagon, who promised to forward it to Richard Bissell, assistant to Director of Central Intelligence, Allen Dulles. The push for the Lockheed seemingly came to a screeching halt when Bissell, pre-occupied with a CIA-backed coup d'état in Guatemala, failed to

[14] Gregory W. Pedlow and Donald E. Welzenbach, *The CIA and the U2 Program* (Washington, D.C.: Central Intelligence Agency, 1998), 11.
[15] Bill Yenne, *Area 51-Black Jets: A History of the Aircraft Developed at Groom Lake, America's Secret Aviation Base* (Minneapolis, MN: Zenith Press, 2014), 30-31. The original concept for the CL-282, later to become the U-2, functioned as a glider that was essentially towed to launch and landed on skids in the center of the plane.

send the proposal for the high altitude spy plane up the chain of command to Director Dulles. By August however, Project Three members of the newly organized TCP met in Washington to conduct research on the state of the intelligence community for the panel's first meeting in September. Philip Strong informed the TCP members of the Lockheed project and by the end of the week the panel members met with Richard Bissell. [16]

Bissell was caught off guard by the request from Project Three. The little he knew of the Lockheed plan from his meeting with Strong was shared with the group. The meeting with the TCP seemed to interest him enough that he prepared a report on reconnaissance with a section reserved exclusively for the Lockheed aircraft. On the other side of the table, Project Three worked closely with Lockheed designer Kelly Johnson and other systems specialists to discuss the design, function, and mobility of the proposed airplane. By the end of October, Project Three had put together a proposal to use the aircraft for high altitude photo surveillance over the Soviet Union. The panel arranged a meeting with Allen Dulles to discuss Lockheed's new aircraft.[17]

Bissell approved of the plan while Dulles was hesitant to introduce an operation into the CIA that was a better fit for the military. Dulles' concern lay in the fact that the CIA was not a military organization nor did he believe in the use of an untested intelligence gathering technique. As the Director of Central Intelligence, Dulles was a traditionalist in regard to spying. Agents infiltrating enemy targets produced greater results than the use of new technology. Dulles felt more comfortable with assisting the Air Force in a joint mission.

The TCP members were equally hesitant about Dulles' CIA-Air Force proposition. The reason for meeting with the Director in the first place was freedom from affiliation with a military organization. An armed aircraft with military signifiers could be grounds for conflict were it to

[16] Pedlow and Welzenbach, 14-17, 29-30; Killian, 82-83.
[17] Pedlow and Welzenbach, 30-32.

be shot down. The TCP concluded that the best option was one directed solely by the CIA: a civilian operation that used pilots in unmarked planes. Lead member of Project Three, Edwin Land, walked away from the meeting with the understanding that Dulles did not think that photo surveillance as "fair play" in regard to spying.[18] After the meeting with Dulles, Project Three and the development of the U-2 spy plane was at an impasse.

The TCP however, was a panel prepared as an advisory committee to the resident. Therefore, they had the Eisenhower's ear throughout the meeting process between the summer of 1954 and the final issue of the group report in early 1955. In November 1954, Edwin Land and James R. Killian, chair of the TCP and later the first Presidential Science Advisor, met with President Eisenhower to discuss the use of the Lockheed aircraft for high altitude surveillance. Eisenhower concurred with the members of the TCP that a military operation gone wrong could result in a declaration of war. He further agreed that the CIA, as a civilian organization, take charge of the U-2 operation, as not to "become entangled in the bureaucracy of the Defense Department."[19] Killian later remarked that this episode was an example of "his responsiveness to innovative ideas" and his willingness to embrace "bold new ideas" in technology.[20] The combined effort of the TCP and the direction from Eisenhower gave Dulles no choice but to concede his position on the matter. Bissell became the CIA lead in the project. Within a couple weeks, Lockheed formally initiated the project and by 1956 the U-2 spy plane began photographing key military facilities in the Soviet Union from 70,000 feet. The advantage of

[18] Pedlow and Welzenbach, 32.
[19] Killian, 82.
[20] Ibid., 83.

operating almost two and a half times higher than the flight ceiling of ordinary aircraft put a new spin on an old issue.[21]

When Eisenhower approved the U-2 program, there was not a legal precedent for overflight past the average service ceiling of conventional aircraft. Fifty years prior when humans first took to the skies in early airplanes, an inconclusive debate took place in Paris between supporters of freedom of the air against those in favor of sovereignty in national airspace. Supporters of freedom of the air argued that like the freedom of open waters, the freedom of airspace should be open to all. Their opponents recognized territorial sovereignty above national boundaries and territorial waters while agreeing that airspace above international waters was free. The debate was not settled until the Paris Convention of 1919. Later, sovereignty was reinforced by the Chicago Convention on International Civil Aviation, when the proponents of sovereignty of airspace won the argument in an international forum.[22]

In 1944, fifty-two nations met in Chicago and established regulations on international air travel. The Chicago Convention established the notion that territorial sovereignty existed over a nation and its territorial waters.[23] With the agreement in place, the contracting states were not required to seek permission to operate over other contracting states territories, but still established guidelines of restricted flying zones of which sovereignty was to be respected. Other rules established that the use of weapons against civilian aircraft over a territory is prohibited (Article 3 bis), pilotless aircraft required special authorization to be flown over a contracting state (Article

[21] The Douglas DC-3, the plane that revolutionized air travel only had a service ceiling of around 23,000 feet.
[22] Peter Haanappel, *The Law and Policy of Airspace and Outer Space: A Comparative Approach* (The Hague, Netherlands: Kluwer Law International, 2003), 3-4, 15; "Convention Relating to the Regulation of Aerial Navigation Signed at Paris, October 13, 1919," October 13, 1919 <http://www.spacelaw.olemiss.edu/library/aviation/IntAgr/multilateral/1919_Paris_conevention.pdf> (accessed January 21, 2015).
[23] Haanappel, 26.

8), and the use of photographic apparatuses may be prohibited or regulated over a contracting state's territory (Article 36.)[24] The delegates from the United States signed the proposal but the USSR lacked representation at the Chicago Convention. Stalin initially favored the creation of an international organization to regulate and govern civil air travel, but recalled the Russian delegate shortly after his arrival.[25]

Clearly, the decision made by the TCP to accept the U-2 program could have violated territorial sovereignty rights as established by the 1944 Chicago Convention. Because the U-2 program was developed as a civilian program, the rules for operation would technically fall within the International Civil Aviation Organization's guidelines. The issue became less obvious when discussing the particulars of the aircraft. The U-2 operated high above the flight ceiling of normal aircraft: high enough to leave the first layer of the Earth's atmosphere and operate from the stratosphere. The Chicago Convention did not determine the vertical depth of a nation's boundaries. It was unclear whether the airspace boundary began at land and carried into infinity, or a nation's sovereignty ended at a definite height. There was (and remains), no clear answer that determined where national air ended and space began.[26] To further confound the issue, the Russian delegation was not present at the convention. Therefore, the USSR was to be treated like a non-contracted member of the International Civil Aviation Organization, i.e., permission was required from the Soviet Union for an overflight of its territory, regardless of the reason for flying. Following the recommendations of the Technological Capabilities Panel, the Eisenhower administration sought a solution that worked to acquire intelligence on the Soviet Union. In doing so, the administration funded the U-2 program, a plane that operated at a flight ceiling

[24] Ibid., 170-172.
[25] Ibid., 18; Russia later joined the International Civil Aviation Organization in 1970.
[26] Dwayne A. Day, "Invitation to Struggle: The History of Civilian-Military Relations in Space," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Vol. II: External Relationships, ed., John M. Logsdon (Washington D.C.: National Aeronautics and Space Administration, 1996), 239.

beyond conventional airspace boundaries. To ensure the legal operation of the U-2 and other future high altitude photo reconnaissance projects, the administration used diplomacy to get the unwitting Soviet Union to agree.

Meeting in May of 1955, just months after the Technological Capabilities Panel convened, the president's National Security Council drafted the first United States policy regarding space. The Council found that the launch of a small scientific satellite would establish the "freedom of space." NSC 5520 determined the launch would bring "considerable prestige and psychological benefits" to the first successful nation that accomplished the task. Those benefits implied that the nation with the ability to put a satellite into orbit wielded great military strength and may sway free world countries to "resist Communist threats," or the opposite effect if the USSR completed the launch first. A satellite launch also provided two particularly important scientific returns. The first was the ability to measure the Earth's ionosphere, which was crucial to long-range radio communication. The second studied orbit patterns, of which was used to develop ICBM technology and later launch a "large" intelligence satellite.[27]

Proponents of freedom of space argued that space—like the freedoms of high seas and airspace—should not be constrained by any one particular nation. Freedom of space allowed a nation the ability to send an object beyond the atmosphere and into orbit without violating a nation's other sovereignty. Space had to be free from any claims of sovereignty for the Eisenhower administration to enact new intelligence programs. The NSC and President Eisenhower realized the abstract barrier of space could be used to determine a new boundary not covered by the Chicago Convention agreements. If freedom of space was agreed upon, the orbit of a satellite over a sovereign nation could legally capture photographic intelligence because it

[27] U.S. National Security Council, "NSC 5520: Draft Statement of Policy on U.S. Scientific Satellite Program," May 20, 1955, in *Exploring the Unknown Volume 1: Organizing for Exploration*, pg. 308-310.

was acting in a "free zone." In essence, freedom of space was used to bypass national rights of security from technological spying.[28] Therefore, the United States had to demonstrate that the intent behind the freedom of space was not for intelligence or military purposes but instead scientific achievement. The United States intended to establish the freedom of space first by launching a small, scientific satellite. With the precedent set through peaceful and scientific means, military satellites could then be launched as a method of gathering intelligence.[29]

Eisenhower attempted diplomacy to achieve the goal of freedom of space in an overt request to acquire intelligence from the USSR. When the Cold War rivals met for the first time in Geneva on 21 July 1955, Eisenhower offered to the Soviet Union, a trade of aerial photography of missile bases and military outposts of each country to the other. Additionally, he supported the use of each other's airfields for takeoff and landing of said photography missions. The Soviet Union and Khrushchev in particular, immediately declined the proposal as a blunt request for information by the Americans.[30] Much like the rest of the Geneva Summit, little was accomplished in the form of hard policy changes to ease the tension between the two nations.[31] The request was a long shot. Eisenhower understood that the Russians probably would not accept the agreement, but whether they did or did not, it provided an opportunity for the president to portray the United States as an open and free nation that was willing to work with its rival.

By requesting information from the Soviet Union, and offering the same in return, Eisenhower made a diplomatic play to acquire intelligence. Psychologically, the move to offer United States intelligence assets in exchange for the Soviet Union's worked in favor of

[28] McDougall, 117.
[29] Hall, "Origins", 219-221.
[30] Roger Launius, *NASA: A History of the U.S. Civil Space Program* (Malabar, Florida: Krieger Publishing Company, 1994), 20.
[31] Saki Dockrill and Günter Bischof, "Geneva: The Fleeting Opportunity for Détente" in *Cold War Respite: The Geneva Summit of 1955,* eds. Saki Dockrill and Günter Bischof (Baton Rouge: Louisiana State University Press, 2000), 3.

Eisenhower's Cold War strategy to secure the loyalty of free nations and lessen the communist threat.[32] Thinking optimistically, acceptance by the USSR would hopefully lower fear of an unforeseen attack by acquiring intelligence. It also met the recommendations of the TCP which insisted on reliable facts and estimates on the USSR missile program. Moreover, Eisenhower's request knowingly coincided with the U-2 overflights that were to begin the following year, as well as the development of observation satellites by the military. In some respects, it was also an attempt to understand the Russian position on freedoms of air and space. The lack of Russian representation at the Chicago Convention in 1944 and the quiet withdrawal of the Soviet Union from the international community in the following decade led to speculation on Soviet global intentions. By trying to establish a policy of openness, Eisenhower simultaneously advertised the United States to the rest of the free world and attempted to understand the Russian position to bring down barriers to cooperation. Because the Russians did not budge on Eisenhower's request, it could then have been assumed that the forecasted launch of a U.S. satellite would raise questions of infringed national sovereignty. An open position on freedom of space however, could be used to work around violation of national sovereignty protected by freedom of airspace.

Eisenhower's concern for national security dictated the earliest version of U.S. space policy. Supported by findings from the TCP, CIA, and the NSC, the stage was set for the United States expansion into space exploration. The missile programs that the reports recommended became the delivery system for space satellites and probes and later the manned capsules of the Mercury and Gemini programs. The need for aerial reconnaissance that *Meeting the Threat of Surprise Attack* addressed was not limited photography from aircraft. The discussion in the TCP and NSC meetings regarding the use of aerial photography in satellites in the same manner was so

[32] John Prados, "Open Skies and Closed Minds: American Disarmament Policy at the Geneva Summit" in *Cold War Respite: The Geneva Summit of 1955,* 220.

sensitive it was deemed confidential until the de-classification of the panel's report finally revealed details on prospective intelligence operations in the late 1990's.[33] The push for high altitude intelligence gathering at first resulted in the secretive U-2 program, but both the TCP and NSC insisted on exploring the efficacy of satellites for global communication and shortly thereafter included intelligence gathering capabilities.[34] Additionally, scientists with the National Academy of Sciences and National Science Foundation and military leaders in the Air Force and Navy explored potential uses for satellite technology. The concern for national defense in the Eisenhower administration ultimately encouraged civilian and military experimentation with sounding rockets and satellites. In the hope that experimentation led to mastery, which would result in greater national security.

The failure of diplomacy in the July 1955 Geneva Summit did not deter Eisenhower from establishing freedom of space. Eisenhower instead returned to covert tactics to carry out intelligence operations. The May 1955 meeting of the National Security Council found that the International Geophysical Year (IGY) provided the perfect pretext to exercise the use of outer space for political and military gains while under the guise of scientific experimentation.[35] The IGY was an effort of scientists around the globe to study various global activities in seismology, geomagnetism, and meteorology as well as share and explore new advancements in satellite and rocket technology. Scheduled to take place from 1957 to 1958, sixty-seven countries sent delegations of scientists to participate in many different projects and share their results with scientists from other nations. Although the project was cooperative and collaborative in nature, governments were largely absent from any international exchange of ideas. At best, the informal

[33] Dwayne A. Day, "Tinker, Tailor, Satellite, and Spy," The Space Review <http://www.thespacereview.com/article/989/1%20accessed%201/22/2015> (accessed January 22, 2015); Zuoyue Wang, *In Sputnik's Shadow* (New Brunswick, New Jersey: Rutgers University Press, 2008), 52.
[34] Killian, 81.
[35] NSC 5520 in *Exploring the Unknown*, Vol. 1, 311.

agreements worked out among scientists of different nations were taken back to their respective countries and reviewed for monetary sponsorship by their governments. If accepted, the projects were worked on by citizen scientists within their own countries who would then report their findings at international conferences. In keeping with the spirit of the IGY, political squabbles between countries did not play a major role in the IGY proceedings. In the field of space research however, this was not necessarily the case.[36]

Within two months of the May 1955 NSC meeting that determined a scientific satellite sponsored by the United States could yield several positive results, officials from the Departments of Defense and State with scientists from the National Science Foundation and professors of the leading universities around the country collaborated on the technical and budgetary aspects of a satellite launch. By 27 July 1955, intelligence reports arrived at the White House stating that the USSR planned to make a statement about launching a satellite for the IGY. [37] While Eisenhower never conceded that he, nor the United States, was involved in a "race for space," the National Security Council and others determined that the psychological impact of a Russian satellite announcement on the free world would be damning.[38] Two days after the intelligence regarding the USSR's upcoming announcement was received at the White House, Press Secretary James Hagerty announced the United States was "going ahead with the launching of small earth-circling

[36] Frutkin, 17-19.
[37] Allen W. Dulles, Director of Central Intelligence, to The Honorable Donald Quarles, Deputy Secretary of Defense, July 5, 1957, in *Exploring the Unknown*, Vol I, 329.
[38] NSC 5520 in *Exploring the Unknown*, Vol. 1, 309; U.S. National Security Council, "Memorandum of Discussion at the 322nd Meeting of the National Security Council, Washington, D.C., May 10, 1957," in *Foreign Relations of the United States, 1955-1975*, Vol. XI: United Nations and General International Matters, eds Robert J. McMahon et al. (Washington, D.C.: U.S. Government Printing Office, 1988), 750.

satellites" as part of participation in the International Geophysical Year.[39] The intelligence reports that launched the United States into the space age were, in fact, premature.

In the Soviet Union, Party officials did not seriously entertain the idea of a coherent space program until after the United States' announcement in July 1955. As early as 1953, officials in the Soviet Union approved scientific research on the feasibility of an artificial Earth satellite. But before a satellite launch Soviet missile technology needed to take a leap forward to place an object from Earth into outer space. Prior to 1953, the Stalin regime kept the focus primarily on the development of long range missiles to compete with the superiority of American long range bombers. The death of Stalin that year allowed high ranking Communist Party officials to re-focus the policies of the Party. Scaling back the authoritarian government that Stalin envisioned as necessary for communism, policy makers took greater consideration of the perception of the Soviet Union in the international community. Leaders did not entirely abandon the use of fear as a tool for political control. Stalin's eventual successor Nikita Khrushchev consolidated power in part through the execution of political rivals. But reformation within Russia loosened restrictions on common citizens and displayed a more moderate and humane vision of communism. After 1953, Khrushchev placed greater emphasis on technological superiority as an example of the merits of the socialist system.[40]

The policy makers of the Soviet Union found no use for exploratory space programs at first. Following the end of World War II, missiles based off of the German V-2 were continually modified and re-tested. But a breakthrough came when Sergei Korolev, rocket engineer and future lead spacecraft designer for the Soviet Space Program, designed the R-7, the world's first

[39] Constance McLaughlin Green and Milton Lomask, *Vanguard: A History* (Washington, D.C.: National Aeronautics and Space Administration, 1970), 33-37.
[40] William Taubman, *Khrushchev: The Man and His Era* (New York: W.W. Norton, 2003), 236-269, 365.

intercontinental ballistic missile.[41] The estimated power of the R-7 turned the dream of outer space exploration into a reality. Armed with scientific articles from the United States and their own research, Korolev and engineer Mikhail Tikhonrvavov, completed a study on the possibility of launching an artificial satellite. The proposal did not warrant an immediate program for space exploration within the Soviet Union but after the U.S. sponsorship of a generic goal to orbit satellites for the IGY in October of 1954, it stirred enough ambition in the Soviet Academy of Science to establish a commission for discussion on space travel.[42]

Korolev believed the prestige value of satellite and manned flight outweighed the military value. Playing to the interests of the policy makers, Korolev appealed to Communist Party officials citing that a government funded satellite would highlight the "high development level of our country's technology."[43] The argument for a space program seemed to work with some defense officials, according to Soviet Space Program historian Asif Siddiqi, who were "no doubt interested in the military application" of a satellite. Although they did not receive funding for a crash program to develop a satellite, Korolev and others were allowed to continue working on the theoretical and scientific aspects of a space program. Through July 1955, Korolev and other academics continued to research, study, and meet with one another on the possibility of a satellite and manned space program. These proposals and research reports travelled through all different levels of the Communist Party, but the scientists failed to capture enough government interest to secure a modified missile as a delivery vehicle, let alone endorse an entire space program. Korolev and others had laid the groundwork for the Soviet satellite project. But it was not until

[41] Siddiqi, 129.
[42] Ibid., 139-145.
[43]Yu. Ishlinskiy, ed., *Akademik S.P. Korolev: ucheniy, inzhener, chelovek* (Moscow: Nauka, 1986), 445, quoted in Siddiqi, 147.

Hagerty's 1955 announcement that party officials would seriously consider an extraterrestrial mission. [44]

Days after Hagerty's address of July 1955, Leonid Sedov, a gas dynamicist and soon-to-be first chairman of the USSR Space Exploration Program, proclaimed that a satellite project would soon be expected from the Soviet Union. Acting on the behalf of the Kremlin, Sedov stated the Soviet Union was capable of completing the project within eighteen months, a half year before the IGY and the estimated American attempt, and launch a larger satellite than the Americans intended to orbit. Sedov failed to go into detail on the Soviet satellite or make an official announcement, but the western press took Sedov's remarks as a direct challenge to the United States' proposal days before.[45]

After the American announcement and the Soviet response, the need for a full scale satellite program became apparent in the Soviet Union. On 30 August 1955 the use of an R-7 missile was approved for a "modest satellite program." Yet the early satellite declaration was approved as a purely civilian-scientist mission and its scope only focused on placing a satellite into orbit. The approved project was one of 250 to later be discussed by the Supreme Soviet, the Soviet's legislative body. Even a Soviet government decree was not enough to ensure the project would lift off the ground. Korolev knew that without the support of high ranking Communist Party members, namely Nikita Khrushchev, who by this time was the clear successor to Stalin, the project, let alone any chance of future space exploration was doomed. [46]

Up until this time, research in missile technology in the USSR was solely focused on achieving a long range strike on a target thousands of miles away. American allies in Western

[44] Siddiqi, 144.
[45] "Russians Say They Intend to Beat U.S. In Launching First Unmanned Satellite," Washington Post and Times Herald, August 3, 1955, Page A1.
[46] Siddiqi, 146-151.

Europe and Navy carriers in the Pacific and Atlantic Oceans ensured that the United States Air Force had access to airstrips to launch bombing runs if war were to break out between the U.S. and Soviet Union. The superiority of the USAF in flight range, payload, and the ability to launch a fast initial or counterstrike put the Soviet Union at a severe disadvantage. Stalin made ICB and intermediate range ballistic (IRB) missiles the top priority of Soviet research and development.[47] The development of the R-7 and successful tests of its predecessor, the R-5 in 1955, made it clear that the missiles were capable of delivering objects into orbit and could easily be converted into rockets with scientific modules rather than warheads. Korolev and others who dreamed of the opportunity to explore space knew that they had to sell space exploration to the Communist leadership. This appeal had to include a low cost adaptation of existing missile technology that replaced a warhead with a satellite, and that satellites would not distract the Soviet scientists from continually improving ICBM systems.

Korolev also emphasized the political significance of beating the Americans into space. A successful launch by the USSR would make a grand statement of Soviet science and technology to the rest of the world. Moreover, the appeal to the Soviet military that resulted in the government decree is likely to have suggested the application of satellites for intelligence gathering purposes.[48] Balancing these considerations, Korolev found an opportunity to make a bid for Khrushchev's approval in February 1956. While at a presentation on the new R-7, Korolev modeled a sample satellite as a companion to the R-7. Korolev appealed to Khrushchev for funding, by highlighting the amount of money the United States was pouring into the rocket and satellite experiment while he underplayed the difficulty and cost for the Soviet Union to achieve the same result. Khrushchev was seemingly convinced and gave the scientist the go-

[47] Taubman, 243.
[48] Some details of decree 149-88ss remain classified, but sources allude to the Ministry of Defense responsible for exploring intelligence gathering capabilities of early satellites.

ahead, with the understanding that the satellite program did not interfere with ballistic missile development.[49]

Nearly half a year passed between the American announcement of a project to launch a satellite and the Soviet commitment to do the same. The chain of events started with the United States, which acted on the basis of their decision off of intelligence that the USSR was prepared to declare a similar project. For the United States, beating the Russians into outer space would establish a legal precedent for the freedom to use intelligence satellites to spy on Soviet military facilities. The psychological effect of a United States satellite launch was considered but always as a secondary objective to the foremost motivating factor, intelligence gathering and the preservation of national security. For the Soviet Union party leadership, psychological factors played a more significant role. The propaganda value of a Russian missile delivering a satellite into orbit legitimized Russian science and technology as effectively as the detonation of the USSR's first atom bomb. It also demonstrated the ability of a Soviet strike or counterstrike on enemy forces. In both cases, launches of civilian-scientific satellites seemed peaceful, prestigious, and outstanding achievements, but beneath the announcements was an attempt to fortify national security and claim military superiority.

Conversely, for the scientists of the US and USSR, the act of placing a satellite in orbit in the name of science surpassed any political motivation. Werner Von Braun, lead of the American Redstone missile program and Sergei Korolev, "Chief Designer" of the Soviet satellite program, shared the vision of space exploration put forth by Robert Goddard and Konstantin Tsiolkovsky, two pioneers in rocketry who never lived to see their dreams realized. The governments who financed the satellite projects made it possible for scientists to achieve their dream but dictated an

[49] Siddiqi, 147, 150.

approach that best fulfilled the needs of the sponsor. Restrictions were not always placed on the outcome either, in the press Korolev's identity was hidden out of fear of U.S. intervention; it was not until his death in 1967 that Korolev's name started to slowly appear in Soviet publications.[50]

Korolev was the chief designer of the satellite project. After the successful test and Khrushchev's blessing, the scientist revisited the satellite proposal that he and others shopped around in 1953. Originally conceived as a sophisticated satellite to accomplish several scientific research goals, "Object D" fell behind development schedule as a result of low priority development and the burgeoning demands of ICBM development. One of those missiles, the R-7, was in the process of being built and tested with the satellite payload in mind. By November 1956, work on the R-7 and the Object D satellite[51] was far enough behind schedule that Korolev, alerted by press reports of a missile launch that established a new flight record in America, feared a United States launch of an IGY satellite was imminent. Concerned that the United States was nearing a successful satellite launch, Korolev requested a change in the proposal for the satellite program. In February 1957, the USSR Council of Ministers, the highest administrative body of the Soviet Union, signed off on a new proposal that allowed Korolev to build two "simple satellites" and allowed the launch of the satellites pending successful R-7 tests.[52] After half a year of failed testing, on 21 August 1957 the world's first ICBM, the R-7, launched from the Kazakh Steppe 3000 miles east over the Kamchatka Peninsula in eastern Russia.

Wasting no time, Korolev approached the State Commission, a temporary body assembled while the R-7 was tested. He requested the launch of the simple satellite as soon as the next launch, scheduled for early September, was completed without issue. Although he faced

[50] Matthew Brzezinski, *Red Moon Rising* (New York: Times Books, 2007), 27.
[51] Object D eventually was launched as Sputnik III with launched with the equipment comparable to the Vanguard and Explorer satellites.
[52] Siddiqi, 151-155.

resistance, Korolev politically maneuvered around the Commission by threatening to take the issue to the Presidium, where surely the State Commission would receive flak for not settling the issue, and gained their consent. After the September test went off without a hitch, the flight of the simple satellite was scheduled for 6 October.[53]

As the R-7 was tested, Korolev's "simple satellite" was constructed. Equipped with radio transmitters and batteries to last a couple weeks, the simple satellite was made ready for launch. Once again, Korolev's drive to beat the Americans into space resulted in a launch date change. An American paper on orbiting the Earth was scheduled to be presented at an IGY conference in Washington D.C. Korolev incorrectly predicted that a satellite launch was to coincide with the presentation and requested the launch be bumped to 4 October. The State Commission complied and late into the evening on Friday 4 October 1957, the R-7 ICBM delivered Sputnik I, the first man-made satellite into Earth's orbit.

The day after Sputnik, the American press questioned where the United States' answer to the Soviet satellite was. The American public expected an immediate response to the socialist strike. The U.S. satellite was announced days before the first mention of a Soviet project and underwent development nearly a year before the Soviet effort. The United States project "Vanguard" won the contract after a protracted contest between the Army and Navy. Members of the Naval Research Laboratory competed with the Army's "Orbiter" project led by Werner Von Braun that used a Redstone missile as a delivery vehicle. The Orbiter project was in fact a joint mission that utilized specialties in all three branches familiar with missile research: the Army, Navy, and Air Force.[54] Despite the collaborative nature of the project, the three branches were

[53] Siddiqi,163-165.
[54] The Air Force also provided its own proposal but was shelved rather early in the process, it called for the use of the Atlas, a missile that was not to be in testing until early 1958, which left less than a year until the

assigned individual components of the Orbiter and lacked any significant inter-department cooperation.

A significant aspect of the Vanguard decision was due to the limited military affiliations of the Navy's project Vanguard. Despite the name of the institute, the Naval Research Laboratory had a long history of scientific experimentation not specifically related to the military. Those who worked on the satellite project were primarily civilian-scientists, in contrast to the Army's von Braun, at the Army Ballistic Missile Agency. The Navy launch vehicle was created from the ground up, based off of two other existing missiles intended for weather research applications, unlike the Army's Redstone missile that was developed specifically for military use.[55] Despite the U.S. government's insistence that the project stay a civilian endeavor, the name selection Project Vanguard is surprising. A term used in military parlance referring to the head of an advancing military formation, Vanguard, was the U.S. government's first attempt to establish freedom of space for later military reconnaissance satellites. The first of which, an Air Force project, WS-117L, was in the contractual stage as the Navy and Army submitted proposals for the IGY satellite launch. [56]

Vanguard began as a bumbled, bureaucratic mess. Nearly a month passed, between September and October 1955, before the Office of Naval Research notified the Naval Research Laboratory that they had won the contract for the satellite. In the beginning, Vanguard was estimated to cost twenty million dollars by the NSC and twenty-eight million by the Naval Research Laboratory. In March 1957, the Naval Research Laboratory estimated the cost of Project Vanguard as closer to $110 million, as research and development proceeded long before a

---

end of the IGY. Additionally, the project was considered as an interference with the development of the missile.

[55] Green and Lomask, 51.

[56] Day, "Invitation to Struggle," 242-243; Curtis Peebles, *The Corona Project* (Annapolis, Maryland: Naval Institute Press, 1997), 25-27.

projected launch date.[57] When informed of the rising costs of the Vanguard plan, Eisenhower questioned the National Security Council in May of 1957 as to when the cost estimates became hard numbers. With no guarantee that the cost of the satellite program would not exceed $110 million, Allen Dulles, Director of the CIA, reminded the president of the "warm welcome" the announcement had on the scientific community. He also warned Eisenhower of the "propaganda weapon" the Soviets would have if they succeeded in their launch first. That weapon would be used to assert the greatness of Soviet scientists and emphasize the commitment the United States had to weapons production rather than peaceful programs. Eisenhower understood the United States was too entrenched to back out, but urged that the scientists find ways to cut costs, though he was "not hopeful."[58]

When it was announced that the Soviets had successfully launched Sputnik I in October 1957, U.S. officials placed the Vanguard program on a higher priority and revisited the rejected Army Orbiter proposal. The Navy and Department of Defense doubled down on Project Vanguard. In November, Korolev's other "simple" satellite, Sputnik II, achieved orbit with a live dog as passenger. Though the United States had had nearly a year more than the Soviets to produce a satellite, the Navy spent a majority of that time creating the new missile derivative. Rather than testing the newly developed Vanguard missile to guarantee a successful launch, the Navy included the satellite in the missile stack so that the satellite would achieve orbit in the testing phase. The first of these attempts was announced to the press as if it were a foregone conclusion the mission would be successful. The launch of TV-3 (Test Vehicle 3) on 6 December 1957 carried the Vanguard satellite three to four feet in the air before the rocket lost thrust due to a pressure leak and exploded seconds after launch. The American attempt was

[57] Green and Lomask, 131.
[58] "Memorandum of Discussion at the 322nd Meeting of the National Security Council, Washington, D.C., May 10, 1957", 750-754.

relegated to what the press immediately deemed the "Flopnik."[59] Not only had the United States been beaten by the Russians twice, but their own failure became the center of a media frenzy.

As quick as it was made a priority, Vanguard took the backseat. The Army proposal was revised by ABMA and received again by the Department of Defense. When TV-3 failed, Werner von Braun and his team at the Army Ballistic Missile Agency were tapped to prepare a missile for an immediate orbit attempt. The DoD understood that von Braun and ABMA had the best shot at quickly answering the call for the Americans after Vanguard I's failure. Passed over initially in part because of the military origin of the satellite's launch vehicle, the Jupiter-C missile, the ability for a quick launch was now the foremost concern to recoup any U.S. credibility lost to the two Sputniks. The missile was developed from the Redstone family of missiles, which were designed and tested beginning in 1952; given the long history of the missile it was a surprise the Army proposal did not get accepted in the first place. The original Orbiter proposal that lost also called for a small five-pound satellite, relatively free of scientific instrumentation and expected to produce little in terms of scientific merit.[60] It was clear that von Braun understood the role of the first satellite to be psychological, rather than scientifically significant. The original calculated launch table surely would have beat Sputnik I, but the Orbiter project had less scientific merit and was more closely tied to military development than Vanguard.[61]

Von Braun now had a chance to re-image his proposal. To compensate for the relationship to the military, von Braun revised the Jupiter-C, added a fourth stage, and renamed it

[59] "Oh, What A Flopnik!" The Daily Herald (UK), December 7, 1957. pg.1
[60] Michael J. Neufield, "Orbiter, Overflight and the First Satellite: New Light on the Vanguard Decision," in *Reconsidering Sputnik: Forty Years Since the Soviet Satellite*, eds. Roger Launius, John M. Logsdon, and Robert W. Smith (Amsterdam: Harwood, 2000), 243-244.
[61] Green and Lomask, 52-54.

Juno.[62] Unlike the Vanguard rocket that was built from scratch with little testing along the way, the Jupiter and its offshoot were developed and tested prior to any launch attempt. The re-branding of the rocket was an attempt to distance from its military ties. Secondly, the Orbiter satellite was scrapped and replaced with the Explorer satellite. Explorer incorporated some of the instrumentation designed for Vanguard and weighed about thirty pounds. While Explorer was still in development, the Soviet Union successfully launched Sputnik II as a commemoration of the fortieth anniversary of the Bolshevik Revolution. Just as it seemed that the United States was incapable to provide an answer to the Sputniks, Explorer 1 was launched into orbit 31 January 1958, thus became the third man-made satellite launched into space. [63]

Beginning in late January 1958, the Army and Navy took turns at Cape Canaveral, Florida in the attempt to match the Russian challenge. The Army succeeded in its first launch of the Explorer satellite on 31 January 1958. Unfortunately for Vanguard the next attempt, a week after the Explorer launch, also failed. Unintentionally reassuring the Navy crew, von Braun and ABMA showed perfection was not possible when the second Explorer failed launch on 5 March. Finally on St. Patrick's Day 1958, the Navy, Vanguard, and the United States matched the Soviet "commonwealth of Sputniks"[64] and successfully orbited Vanguard I, the United States' contribution to the International Geophysical Year.

The launch of Sputnik I was a true testament to the Soviet position on freedom of space. Ironically, it proved to be as beneficial to the United States had the Vanguard been first. By orbiting the small satellite, the Soviet Union essentially accepted an open position on the issue.

---

[62] Howard E. McCurdy, *Inside NASA: High Technology and Organizational Change in the U.S. Space Program* (Baltimore: Johns Hopkins University Press, 1993), 16; Launius, *History of the U.S. Civil Space Program*, 27; Killian, 120.
[63] Day, "Invitation to Struggle," 246.
[64] "Partial Text of Khrushchev Talk to Parliament," Washington Post and Times Herald, November 7, 1957. B14.

The USSR tested the waters: the socialist country that orbited a satellite above their free world rivals did not raise consternation about the nature of satellite overflights.[65] The United States, which already favored an open position on the orbit of satellites above their territory, could safely carry out their space program. More importantly, the United States could begin launching covert intelligence satellites, without repercussion from their Cold War rivals, assuming the spy instruments remained undetected.

Despite Eisenhower's willingness to embrace new technology for national security purposes, the launch of Sputnik I in October 1957 was not pressing enough for the president to enter into a competition with the Soviet Union. Nor did it cause Eisenhower to admit the presence of a competition. In the White House reaction to Sputnik, Eisenhower congratulated the Soviet Union on the achievement but told American citizens the American focus on scientific merit and the effort to detach the U.S. satellite program from the military was what allowed the Soviet Union to beat the Americans into space. A U.S. satellite launch would have been possible through the use of an already developed missile, but such was not the spirit of the IGY.[66] The satellite program of the IGY was strictly a scientific endeavor on its face, but the press was not told the true reason for the orbit of an Earth-circling satellite was the establishment of Open Skies.[67] Eisenhower's response to the first Sputnik was calmly measured: he intended to allay fears of Soviet military prowess. But the launch of Sputnik II reinforced the concern of the public on the lagging American program. Although his advisors and reports from the NSC and TCP warned of the psychological effects of the launch, and Eisenhower was fully aware of

[65] Hall, "Origins," 227-228.
[66] "Official White House Transcript of President Eisenhower's Press and Radio Conference #123 Concerning the Development by the U.S. of an Earth Satellite," October 9, 1957, <http://www.eisenhower.archives.gov/research/online_documents/sputnik/10_9_57.pdf> (accessed January 25,2015), 3-4.
[67] NSC 5520 in *Exploring the Unknown*, Vol. 1, 309.

psychological impacts, he underestimated the repercussion the Sputniks had for the American public.

As early as 1954 Eisenhower and scientific and military leaders were under the impression that Soviet scientists were working on a satellite program. This intelligence led to a pre-emptive announcement of the satellite project for the IGY in 1955. The need for reliable intelligence on the Soviet Union and the security of national defense was the foremost motivator for early space policy. The United States, thanks to the U-2 program Eisenhower enacted, began to gather intelligence on Soviet launch facilities as well as military capabilities. Subsequent U-2 overflights of the Kazakh Steppe led to the first uncovering of the missile testing ground and launch facility of the Soviet space program in August 1957. The role of the U-2's severely diminished when pilot Francis Gary Powers was shot down over the USSR in May 1960. The incident caused a weakening of U.S.-USSR relations and prematurely ended the hope for détente between the two superpowers.[68] While the 1960 U-2 incident did not end the spy program, it was the last revealed overflight of the Soviet Union. It accelerated the development of spy satellites to continue reconnaissance over the Soviet bloc.

Sputnik II launched on 3 November 1957 carrying the dog, Laika, put U.S. public mood in an even worse position, especially since the satellite seemed on the surface more sophisticated than the first. After the successful launch of Sputnik II, at a meeting of socialist countries commemorating the fortieth anniversary of the Bolshevik Revolution, Khrushchev pointed out how the Americans seemingly backtracked on their Vanguard program. Sputniks I and II became the true "Vanguards" and invited the United States satellite to join them to create a "commonwealth of Sputniks." Khrushchev encouraged a race of space exploration. This style of

[68] Walter L. Hixson, *Parting the Curtain: Propaganda, Culture, and the Cold War, 1945-1961* (New York: St. Martin's Press, 1997), 219.

competition he noted was much preferred over the arms race and weapons manufacture.[69] The first Vanguard explosion on the launch pad on national TV further cemented the perception of U.S. inferiority. Vice President Richard Nixon was tapped for comment on behalf of the president, who was in recovery from a stroke: "[Vanguard and the rocket] was not a military missile… [the explosion] in no way indicates lack of progress or failure in the military field."[70] As a result of public pressure, the White House recognized the connection between the ability to put a satellite in orbit and the strength of the military, regardless of civilian or military origin. Eisenhower was forced to respond to rebuild the American public's peace of mind. National prestige took a blow with the televised failure of Vanguard. The Sputnik episodes proved that science and technology was to play a major role in national security and global politics. Eisenhower sensed that change was imminent. Public and Congress demanded a solution from the federal government. Despite his distrust of government bureaucracy, his position as president allowed him to control the federal government's response. Pressured by the public, Eisenhower set out to alter the government's responsibilities concerning science and technology.

Eisenhower's first change moved the Science Advisory Committee from the Office of Defense Mobilization and into the White House. The committee was renamed the President's Science Advisory Technological Capabilities Panel *Meeting the Threat of Surprise Attack* that advocated early space exploration for purposes of national defense. The Panel's chair, Dr. James Killian, became the first science advisor to the president upon its inception. Killian organized and recommended members to PSAC, all of whom Eisenhower approved.[71] PSAC's role was simple: members facilitated communication between scientists and the government. For Killian,

[69] "Partial Text of Khrushchev Talk to Parliament," Washington Post and Times Herald, November 7, 1957, B14.
[70] "Rocket Flop Disappoints Eisenhower," Washington Post and Times Herald, December 7, 1957, Pg A2.
[71] Killian, 107.

Sputnik had created a nationally recognized need for scientists in the White House. As for Eisenhower, he understood that the satellite increased the role of science and technology in the federal government. He simply "needed their help."[72]

Secondly, Eisenhower advised Secretary of Defense Neil McElroy to create the Advanced Research Projects Agency (ARPA). In an effort to centralize military space activities, ARPA was established with the intent to eliminate similar projects and cut down on interservice rivalries. Despite the hope that rivalries would be quashed, advocates of the Army, Air Force, and Navy space projects continued fighting among themselves. [73]

The creation of PSAC in December 1957 offered Eisenhower slight relief from political pressure by Congress. It also allowed Eisenhower the ability to shape science policy without total interference from the legislative body. Congress, led by Senator Lyndon Johnson had been investigating the inferiority of American space efforts to the Soviet Union within two weeks of Sputnik II's launch in early November. Johnson's investigation revealed that lack of organization, funding, and inability to prioritize the relationship of space to national prestige, caused the United States to lag behind the Soviet Union. He called upon the Senate to establish a committee on space and aeronautics to create a charter for a new space exploratory organization. Accepted by the Senate and later the House of Representatives, the Congressional move proved to Eisenhower that despite his prudent attempt to control the pace of change in the federal government, Congress would not allow anything less than a special organization to deal with the global-political situation that the Sputniks posed.[74]

---

[72] Ibid., 111.
[73] Paul B. Stares, "Space and U.S. National Security" in *National Interests and the Military Use of Space*, ed. William J. Durch (Cambridge, Mass.: Ballinger Publishing, 1984), 41; Killian, 129.
[74] Launius, *History of the U.S. Civil Space Program*, 29.

Eisenhower showed foresight when, two days prior to the establishment of Johnson's committee, he directed PSAC to outline a new space program and assess the ability of an organization to manage it. The recommendation was printed as an *Introduction to Outer Space*. In a press conference, Eisenhower excitedly read from the report and distributed copies to the press around the world as a "policy statement for the United States."[75] A meeting between the president and White House officials on 4 February 1958, including Dr. Killian, highlighted Eisenhower's continued reluctance to organize a civilian-scientific space program when he believed the focus should continue on the national defense aspects of space research. He commented to the meeting members he would: "rather have a good Redstone than be able to hit the Moon, for we [do not] have any enemies on the Moon."[76] PSAC received requests from the DoD, Advanced Research Projects Agency (ARPA), Atomic Energy Commission, and the National Advisory Committee for Aeronautics (NACA), who had advised the military on a number of projects, among other organizations interested. Faced with a number of choices, it became clear that NACA was best suited to fill the organizational needs of space exploration. However, NACA was completely free from political control. Congress, the president, or the Bureau of Budget (BoB) had no political oversight. NACA was led by volunteer scientists who acted in an advisory role. Considering the cost of space exploration projects and the importance of national prestige attached to space, the BoB and Congress would not buy into an organization free from federal administrative control. Instead a consensus of BoB, PSAC members, and the Executive Branch favored a reconstitution of NACA to include federal government oversight. The result was the National Aeronautics and Space Administration.[77]

[75] Killian, 123-24.
[76] Launius, *History of the U.S. Civil Space Program, 148.*
[77] Ibid., 131-132.

In the wake of the Sputniks, media, public, and Congressional pressure forced Eisenhower's hand into extending the role of the federal government. The retired general feared neither Sputniks nor the Russians, but the unsustainability of a vast government bureaucracy. Unable to sit idly by, Eisenhower controlled the response of the federal government and created a civilian organization to be tied to the policies of the U.S. government. In this atmosphere, NASA was created to specifically counter the Russian threat. Sputniks I and II suggested that American technological superiority was under fire. The inability of the United States to respond quickly and sufficiently trump the Soviet feat lent credence to the notion that the U.S. had fallen behind. Thus the goal of the first decade of NASA programs was charted: to surpass Soviet space efforts and reclaim American technological superiority.

CHAPTER TWO

PRESTIGE AND COMPETITION

Competition with the Soviet Union was the mission for which NASA was created. The public and the Democrat-controlled Congress judged the launch of Sputnik not as a peaceful satellite program, but as a sign of the technological advancement of the Soviet Union the United States was unable to immediately match. Eisenhower, in his capacity as president, was aware of Soviet missile building operations. He authorized regular U-2 flights over Soviet territory to investigate growing Democrat claims of an unfavorable missile gap.[78] Of course, Eisenhower could not make the information publicly available lest he betray the covert operation. To assuage public fears following the Sputnik launches, the National Aeronautics and Space Administration was created. The passage of the National Aeronautics and Space Act of 1958 was the result of external pressure of Cold War politics and internal pressure from the American public and Congress.

The most outspoken of these congressional leaders was Senate Majority Leader Lyndon Baines Johnson (D-Texas.) Upon Sputnik II's announcement in November 1957, Johnson headed a special Senate inquiry into space and missile programs. Johnson conducted the hearings for three months, until the end of January 1958. The findings of the special committee were made more popular as a result of the televised failure of TV-3 in December.[79] Johnson's report, *Inquiry into Satellite and Missile Programs*, concluded that Soviet progress in missiles surpassed that of the United States and the increased production of other war machines was set to do the same. Each day's findings made daily news over the entire length of the proceedings. As Eisenhower

[78] Taubman, 443.
[79] McDougall, 153.

attempted to quell fears, Johnson's interviewees helped re-instill them. General John Medaris, Commander of the Redstone Arsenal, helped reinforce interservice competition when he testified to the committee that had Project Orbiter been selected for the IGY, he "very definitely" would have achieved the U.S. goal much earlier.[80] In short, the publicity that surrounded Johnson's committee reinforced the fears echoed by press coverage over those three months. Testimony from scientists, military officials, heads of corporations with military contracts, and others aligned with the story advanced through media hysteria. As a result, the Democratic Party adopted these findings as examples of Republican misrule. The perception of falling behind the Soviet Union in weapons production helped lead the Democratic Party to victory in the 1958 and 1960 elections.

With two years remaining in his presidency, Eisenhower looked to major policy changes to appease the public. Popular opinion was unconvinced by his passive attitude toward the Soviet space achievements. Though Eisenhower preferred a small federal government, PSAC recommended he create a new civilian government entity with executive oversight. Congress agreed. The National Aeronautics and Space Act was drafted in April 1958 and debated in Congress for nearly four months. The original proposition for charter faced opposition from Senator Johnson because the organization lacked a body to direct space policy. Eisenhower envisioned an advisory body to direct the president on policy just as he established with PSAC. Upon the senator's recommendation, the final bill included the addition of a National Aeronautics and Space Council to create space activity goals, direct projects to civilian and military scientists, and oversee cooperation between NASA and the DoD.[81] Additionally, the revised bill included a Civilian-Military Liaison Committee to promote communication and cooperation between leaders

[80] Senate Committee on Armed Services, Preparedness Investigating Subcommittee, *Inquiry into Satellite and Missile Programs: Hearings Before the Preparedness Investigating Subcommittee of the Committee on Armed Services*, 85th Cong., 1st sess., December 1957, 560.
[81] Launius, *History of the U.S. Civil Space Program*, 32.

of civilian space efforts and heads of military projects for the sake of expediency in all space exploration goals.[82]

The concerns of Johnson and other Congressional leaders were met. President Eisenhower signed the National Aeronautics and Space Act into law on 29 July 1958. The final product reflected much of Eisenhower's initial views on the freedom of space, the peaceful exploration of space, and the protection of national security. It also indicated how Eisenhower finally realized the prestige value of space exploration. The Act defined one of its major goals as the "preservation of the role of the United States as a leader" in the application of science and technology.[83] Moreover, like the IGY announcement in 1955, the NASA bill underscored the peaceful, non-aggressive use of space and encouraged the collaboration between military scientists and civilian scientists.

The bill proclaimed a United States space program centered on prestige, but failed to outline any short or long term goals to suggest how prestige could be won. Project Vanguard continued in the new agency as the focus on space exploration remained on satellites. Other space projects were adopted from the National Science Foundation, NACA, and ARPA.[84] But the first two years of NASA's existence dealt primarily with departmental organization and expansion. The acquisition of the Army Ballistic Missile Agency and the von Braun team on 1 July 1960,[85] and the addition of the Naval Research Laboratory to NASA prompted officials to finalize future goals for manned and unmanned space exploration. Like Eisenhower's early space

[82] Paul G. Dembling, "National Aeronautics and Space Act of 1958: Revisited," *Journal of Space Law* 34, no. 2 (January 2008): 212-214.
[83] *National Aeronautics and Space Act of 1958*, Public Law 85-568, 85th Cong., 2d sess. (July 29, 1958), 1.
[84] Hall, "Origins", 226.
[85] *Transfer of Von Braun Team to NASA*, H.R. 567, 86th Cong., 2d sess. (February 26, 1960). Some objection was raised to the inclusion of the von Braun team in NASA. Concerned that the lines between civilian and military would be blurred with the established Huntsville group, the resolution was adopted nearly unanimously however and the von Braun team was transferred after a long wait for the new fiscal year to begin.

commitment, NASA goals were never intended to publicly compete with the Soviets. Such thinking limited NASA's role to a reactive organization rather than a scientific organization whose leaders dictated their own goals and achievements. Internally, however, meetings of the National Security Council recognized the importance of competition with the Soviet Union and advised long term policies to regain preeminence as the world's technological leader.

As NASA organized in June 1959, the NSC and Eisenhower met to discuss the direction of the civilian space program. As far as the NSC was concerned, it was imperative that NASA be used to resolve several issues, all of which necessitated competition with the Soviet Union. First, the group recognized that the USSR surpassed the U.S. in space exploration. Second, the Council found that had the Soviet Union continued to establish space spectaculars then U.S. leadership and prestige would be undermined. Next, the group recognized that space "firsts" achieved by the Soviet Union lent credibility to claims of superiority of the socialist system and showed promise of technological progress in the future. Finally, if the Soviet Union achieved military capability of outer space it "could" create an "imbalance of power" if outer space was weaponized. Early versions of the findings show that the Soviet-Sino alliance unnerved the NSC. Rumors of a Chinese satellite persisted. The threat of another Communist nation with the capability of a space launch jeopardized the balance between free west and socialist east. Unless, of course, a satellite launch by an additional democratic state re-balanced the scale.[86]

Privately, the chairman of the Joint Chiefs of Staff commented to the Secretary of State upon reviewing the preliminary document that policy should also focus on "opening up the Soviet bloc through intelligence and potential scientific cooperation." These comments were not

[86] U.S. National Security Council, "NSC 5814/1: U.S. Policy on Outer Space," June 20, 1958, in *Exploring the Unknown Volume 1: Organizing for Exploration*, 345.

included in the final statement of NASA policy.[87] The NSC recognized competition as the impetus of early space exploration. Direct cooperation with the Soviet Union was discarded for the time being; capitulation to the Soviet Union without an attempt to demonstrate that the United States was technologically superior would affirm Soviet claims. To the Soviet Union, cooperation was also counterproductive. It would reveal evidence that contradicted what the Soviet propaganda machine claimed. Historian Walter McDougall pointed out that the difference between Soviet statements and tangible truths stymied U.S.-U.S.S.R. cooperation. The Soviet Union perhaps led in space rocketry but was deficient in almost all other areas of space science and technology.[88] Six months after NASA was founded, the first official policy on outer space was formulated.

As a joint resolution by the National Security Council and the National Aeronautics and Space Council, the first policy on Outer Space was released in January 1960. The policy did not announce the beginning of any specific projects but rather long term objectives and uses of the space program in respect to national defense. The foremost of these were to investigate projects that "[minimized] the psychological advantages" of Soviet Union successes and re-established United States' technological superiority.[89] To obtain the maximum psychological benefits of a space program, it was understood that manned space flight and exploration demonstrated the ability of the United States to "catch up" to the Soviet Union. The policy recommended that a manned flight program begin as soon as "reasonably practicable."[90]

This policy statement was taken from a proposal for a manned satellite program proposed between the passage of the NASA bill and the beginning of NASA operations. Eisenhower,

[87] NSC 5814/1 in *Exploring the Unknown Vol. 1*, 361.
[88] McDougall, 184.
[89] NSC 5814/1 in *Exploring the Unknown Vol. 1*, 367.
[90] Ibid., 367-368.

acting on the advice of PSAC, directed NACA to work on manned satellite program. The project became a joint proposal from NACA and ARPA, who used the proposal to request funds from Congress. When NASA opened on 1 October 1958, newly appointed NASA Administrator T. Keith Glennan was presented with the manned spaceflight program and immediately signed off on the proposal. He later correctly speculated that plans for a manned program were in place "before NASA was born."[91] By April 1959 NASA selected the first seven astronauts of the project codenamed *Mercury*. Despite the media excitement and optimistic press treatment, NASA failed to capitalize on the fervor and announce a long term commitment to manned flight after the Mercury program. Eisenhower was not seemingly interested in a protracted, expensive endeavor that he believed lacked "intrinsic value."[92]

As Eisenhower's final presidential term came to a close, relations between the United States and Soviet Union were seemingly deteriorating. On 1 May 1960, a U-2 spy plane was shot down over Soviet airspace. When pressed for answers, the United States government covered up the purpose for the overflight and stated that the U-2 was in fact a NASA test plane. The story was upended as soon as the Americans found out that the pilot, Francis Gary Powers was indeed alive.[93] Within days, Eisenhower admitted he had given authorization for the flight, and admitted that the purpose was an intelligence gathering mission. The U-2 incident preceded a summit in which the U.S., Soviet Union, France, and the United Kingdom attended two weeks later in Paris. As a result of the spy plane controversy, the so-called "Four Powers Summit" was deadlocked as a result of political turmoil and mistrust of the western powers by the Soviet Union. What could

[91]T. Keith Glennan, *The Birth of NASA: The Diary of T. Keith Glennan* (Washington, D.C.: National Aeronautics and Space Administration, 1993), 13; Homer Newell, *Beyond the Atmosphere: Early Years of Space Science* (Washington, D.C.: National Aeronautics and Space Administration, 1980), 107; Loyd Swenson Jr., James Grimwood, and Charles Alexander, *This New Ocean*, 111.
[92] John M. Logsdon, "The Evolution of U.S. Space Policy and Plans" in *Exploring the Unknown Volume 1: Organizing for Exploration*, pg 378.
[93] Taubman, 457.

have been a promising conference to make a step to end the Cold War, further escalated tension between Communist Russia and the free West.

Eisenhower's farewell address is often reflected upon as a warning to his successor, and the American public at large, on the "grave implications" of reliance upon the burgeoning arms industry. Along these same lines, Eisenhower warned against the "temptation" of applying a "spectacular and costly action" as a "miraculous solution" to foreign or domestic challenges. Akin to the rising military-industrial complex, the emergence of the "scientific-technological elite" threatened the control of public policy.[94] In other words, the purveyors of applied science and technology offered untested, expensive solutions that threatened a stable economy, balanced budget, and a limited government. Eisenhower's vision of security did not rely solely on military strength but economic stability and small government. Federal government intervention in technological progress disrupted the "natural" scientific process. Investment in scientific research made the federal government beholden to the interests and inventions of the scientist. The scientist was no longer a "tinkerer" who worked out of curiosity, but instead strove for a high paying government contract. His farewell address, it seems, was more directed toward the `Democratic Party who was soon to control both houses of Congress and the presidency.

Despite his later warning about the scientific elite, Eisenhower capitulated to the creation of NASA as a result of public opinion and congressional challenge. This addition to the federal government was viewed as a long term solution to a short term problem. Eisenhower set the United States on a path he did not want to go down, but with his final presidential term in its "lame duck" years, a government response may have been inevitable. The next president to take office may have resorted to creating an entire Department of Science and Technology. By taking

[94] "Eisenhower Farewell Address (Full)," YouTube video, 15:44. Posted by "someoddstuff," January 16, 2011. <https://www.youtube.com/watch?v=CWiIYW_fBfY>.

the initiative, Eisenhower hoped NASA would have as little effect on increasing the size of the federal government as possible. NASA was created as a civilian organization with oversight granted to the president. The relocation of the Science Advisory Council to the executive enabled the president to make informed decisions without the added level of bureaucracy of a new federal department. Eisenhower let NASA officials plot their own course, but a renewed fear of Soviet technology by the American public, made a new president take a more active role in defining NASA's programs.

In this atmosphere of rising tension, the Cold War became a major topic of the presidential campaign of 1960 that pitted Vice President Richard Nixon and Democrat challenger Senator John F. Kennedy. The campaign exemplified the extent to which technology and media had changed the way politics in the country was decided. Alongside the often repeated analysis of the first televised images of a presidential debate that engaged a calm and stately Kennedy against a sweaty and poorly made up Nixon, Kennedy and the Democrats used the perceived scientist, engineer, and missile gaps as major platforms against the Republican incumbents. Kennedy recognized the lack of American prestige internationally, not only as a result of the space race and other developments with the Soviet Union, but domestic scourges such as unequal Civil Rights that damaged the United States' stance as an example of freedom. Rarely making space specifically a campaign issue, Kennedy acknowledged the presence of the "space race" in which the United States was clearly behind.[95] Nixon argued the opposite: that Khrushchev's policies and refusal to commit to peaceful western treaties made Soviet Union prestige low and

[95] John M. Logsdon, *John F. Kennedy and the Race to the Moon* (Palgrave-Macmillan: New York, 2010), 10. Chapter 1 deals with the limited role of U.S. space efforts in the presidential campaign of 1960

claimed American prestige was at an all-time high.[96] In the closest race in presidential history, Kennedy defeated Nixon by a tenth of a percent in the popular vote to win the presidency.

The period between the election and the inauguration was a formative time for Kennedy's outlook on space. As the first President-Elect to assemble a transition team to prepare for the presidency, Kennedy directed Jerome Wiesner, his presidential science advisor, to evaluate NASA and the feasibility of manned space flight. To Kennedy's surprise, the report essentially co-opted Eisenhower's position on space exploration. That is, the infancy of the field, the expenditures of a long term manned program, and a low prestige-per-dollar ratio, argued against a large-scale astronaut program. Space efforts placed in near-earth orbit and the development of communications and weather satellites had greater intrinsic value than a manned program. The report even advised that the Mercury project be re-examined so that if the death of an astronaut occurred, the Kennedy administration could not be held liable. Manned space efforts, according to Wiesner, "[should not] be advertised" as a major objective in space activities. He also advised Kennedy to "diminish the significance of this program."[97] Unmoved by the recommendation to cancel the manned flight program, Kennedy stuck to a view that emphasized national prestige. As a result, Project Mercury was left untouched, neither halted nor expedited. Kennedy understood the power that space exploration signified in public and world opinion. NASA's projects continued to play a role in defense and military capabilities as it had in the Eisenhower era, but Kennedy understood the goals of NASA to be more centered on prestige than his predecessor.

---

[96] John F. Kennedy and Richard M. Nixon, "Presidential Candidates Debate: October 7, 1960," C-SPAN video, October 7, 1960, <http://www.c-span.org/video/?33149-1/presidential-candidates-debate>.
[97] Wiesner Committee, "Report to the President-Elect of the Ad Hoc Committee on Space," January 10, 1961 <http://www.hq.nasa.gov/office/pao/History/report61.html> (accessed 2/28/15), 16.

Kennedy's inaugural address in January 1961included a request to the Soviet Union to reconsider the use of science during this period of heightened Cold War tension. Rather than engaging in an arms race, Kennedy advocated arms control through the U.N. and a cooperative scientific effort of the United States and USSR to "explore the stars" and other areas of scientific exploration rather than let the development of nuclear weapons determine international policy.[98] Despite his peace proposal, once he assumed the role of president, the USSR seemed little interested in cooperation of space efforts. Furthermore, Kennedy's public request for cooperation in space ran contrary to private requests to explore the efficacy of manned space flight to restore U.S. prestige and legitimize the United States as a formidable space power.

There was indecision on the part of the new president in determining the future of the U.S. space program. One of Kennedy's first moves was to transfer the responsibilities tasked to the president by the National Aeronautics and Space Act to the Vice President. Lyndon Johnson had added to his personal recognition by chairing the committee that probed government employees after the launch of Sputnik was simply better fit and better connected to do the job. The origin of this assignment is somewhat unclear; some sources suggest that Johnson requested the transfer of responsibility, while others suggest that the idea originated with Kennedy himself.[99] With the departure of T. Keith Glennan as NASA's Administrator, the president was slow to find a replacement. Vice President Lyndon Johnson started a candidate search that lasted over a month, to the ire of Kennedy. Days after Kennedy told Johnson he would act if Johnson could not find a successor, James Webb, a former head of the Bureau of Budget and deputy to

[98] John F. Kennedy: "Inaugural Address," January 20, 1961. Online by Gerhard Peters and John T. Woolley, *The American Presidency Project* <http://www.presidency.ucsb.edu/ws/?pid=8032> (accessed 2/28/15).
[99] Robert Dalek, "Johnson, Project Apollo, and the Politics of Space Program Planning," in *Spaceflight and the Myth of Presidential Leadership*, ed. Roger D. Launius and Howard E. McCurdy (Urbana: University of Illinois Press, 1997,) 70-74.; Logsdon, *JFK and the Race to the Moon,* 29-31.

Dean Acheson in the Department of State, accepted the nomination, albeit hesitantly.[100] In March of 1961, Webb requested a thirty percent increase in the 1962 budget for future space exploration, which Kennedy was not ready to support. He did, however increase it marginally, but it was not until a month later, that Kennedy's position on American space activities was cemented.

Three months into office, on 12 April 1961, Yuri Gagarin rode atop a Vostok rocket, an off-shoot of the R-7 missile that hurdled the Sputnik into orbit, and became the first man in space. Although Kennedy discovered the "missile gap" platform on which he ran for office was false, the flight of Gagarin reinforced U.S. technological inferiority in comparison to another Soviet space accomplishment. Coinciding with the failed Bay of Pigs operation on 20 April 1961, Kennedy tapped Vice President Lyndon Johnson to find a space "program which promises dramatic results in which [the United States] could win." Johnson was also asked to find out the additional cost and whether those programs were worked on 24 hours a day.[101] A week later, Johnson informed the president that the United States could "conceivably" land a man on the Moon by 1966 or 1967. Johnson ended his memoranda by stating that "we are neither making maximum effort nor achieving results necessary if this country is to reach a position of leadership."[102] Rocket wizard Wernher von Braun chimed in, that the United States had a "sporting" chance to beat the Soviets in sending men *around the Moon*, and an excellent chance

[100] Logsdon, *JFK and the Race to the Moon,* 39-45.
[101] John F. Kennedy, "Memorandum for Vice President," April 20, 1961, in *Exploring the Unknown Volume 1: Organizing for Exploration,* pg 424.
[102] Lyndon B. Johnson, "Memorandum for the President: Evaluation of Space Program," April 28, 1961, in *Exploring the Unknown, Volume 1: Organizing for Exploration*, 428-29.

of beating the USSR to a Moon landing.[103] All of the feedback indicated that well over a billion dollars would be necessary for a successful program.

The call for additional resources was handled by Johnson. Using his extensive political ties, Johnson drummed up Senatorial support for a forthcoming request for money from the president. A cadre of Senators committed to the project was encouraged by the sub-orbital flight of Alan Shepard who became the first American in space on 5 May 1961. Shepard's flight also helped win support from inside NASA, perhaps most significantly from Administrator Jim Webb who had remained skeptical on the necessity for such a project. Webb sent Johnson recommendations for the Apollo program: a manned lunar mission that was previously shelved by Eisenhower for its lack of intrinsic value. The recommendation called for additional funds, changed priorities, and re-coordination of programs applicable to the Moon landing proposition. Former chief historian of NASA, Roger Launius, has argued that Webb used this opportunity to enhance the scientific value of a manned lunar flight. Webb included satellite projects, advanced rocket boosters, scientific experiments, and probes to the Moon. Anything that could be related to a lunar landing was lumped into the program with the assurance that money was flowing freely to NASA. Johnson summarily accepted these items and forwarded to Kennedy, who approved Webb's vision for NASA.[104]

According to historian Walter LaFeber, Kennedy regarded his first eleven months in office as a series of international crises.[105] Gagarin's historic flight occurred on April 12, a week later a failed coup d'état backed by the CIA to over throw communist Fidel Castro in Cuba heightened tension between the U.S. and Soviet Union. By the end of the year, the Berlin Wall

[103] Werher Von Braun, "Wernher Von Braun to the Vice President of the United States," April 29, 1961, in *Exploring the Unknown, Volume 1: Organizing for Exploration*, 430.
[104] Launius, *NASA: A History*, 64-65.
[105] Walter LaFeber, *America, Russia, and the Cold War 1945-1990*, 6th ed. (New York: McGraw Hill, 1991), 219.

was constructed and nuclear testing resumed in the Soviet Union. Southeast Asia and Latin America were plagued with civil unrest and traditional governments overthrown in favor of communist dictatorships. Responding to these challenges, Kennedy resumed underground nuclear testing in September 1961 and supplied the insurgency in Laos. In space, Kennedy came to support defense systems, i.e., anti-satellite satellites, and a manned program to outshine the Russians. LaFeber contends that Kennedy actually adopted Eisenhower's Cold War responses to Communist challenges rather than provide an alternative solution. What Kennedy did not carry over from the Eisenhower presidency was the greater emphasis he placed on prestige in space exploration. Kennedy's response to Gagarin, legitimized through executive power, made the race into space a fixture of Cold War competition. Kennedy believed all of these failures were reflective of a larger competition between communism and free western capitalism. Rather than dismiss the Russian achievement as an apolitical event, as Eisenhower did with Sputnik, Kennedy acknowledged and admitted publically that the United States was in a race against the Soviet Union.

These "extraordinary times" that Kennedy detailed in a joint session of Congress in his 25 May 1961 "Urgent National Needs" message called for large appropriations to fund several fronts in the Cold War. Often considered his second State of the Union address, Kennedy requested money for the struggle in Southeast Asia, to shore up national defense, and of course, for NASA to achieve the goal of landing an American on the Moon by the end of the decade.[106] Almost a year and a half later, Kennedy remained committed to the space goal; with great fervor he addressed a crowd at Rice University in Houston, which had just donated land for a new NASA center. In the public address, Kennedy contended the United States was in a race to the

[106] John F. Kennedy, "Special Message to the Congress on Urgent National Needs," May 25, 1961, online by Gerhard Peters and John T. Woolley, *The American Presidency Project*, <http://www.presidency.ucsb.edu/ws/?pid=8151>.

Moon against a competitor not willing to admit their failures and affirmed that the goal will be accomplished.[107] Publicly, Kennedy cemented the race for space as integral to the position of America as a world leader in science, technology, and as a world symbol of freedom as opposed to Communist rule.

Privately, Kennedy more candidly expressed the political necessity of the American goal to land on the Moon. In an off-the-record conversation inside the White House on 21 November 1962, Kennedy, Webb, Wiesner, and other NASA personnel met to discuss the lunar landing program. When questioned on the priority of the Moon landing program, Webb countered that it was one of the top priority missions, but at the time not the preeminent program. Kennedy audibly unnerved by Webb's answer, stressed the political impact of the first Moon landing on the international stage, but seemed to fail to grasp what Webb was specifically stating. It was not that Webb had not made the Moon program the top priority; instead he stressed the scientific preliminary programs that aided in the Moon landing were of the highest priority. Wiesner supported Webb stating: "We don't know a damn thing about the surface of the Moon," that in order to avoid the ramifications of a tragic accident, the scientific programs that gain information about the Moon have to "have the highest priority." Seemingly unfazed by Wiesner's defense, Kennedy followed up with his concern about the budget. He estimated the expense of a lunar program to be six to seven billion dollars, that if NASA was going to demand that much money, he wanted to ensure every penny was invested in the space program. The audio of this meeting was released in 2001; historians quickly pointed to the fact that Kennedy remarked "we shouldn't be spending this kind of money because I'm not that interested in space." The quote is better attributed to Kennedy's pragmatism. He did not necessarily state he did not care for space exploration, period, but rather a six or seven billion dollar investment into a science and

[107] John F. Kennedy, "Moon Speech," Rice Stadium, September 12, 1962.

technology program would be better used in other areas, highlighted by the fact that he mentioned "we need to find out about cancer and everything else."[108] In the meeting, Kennedy revealed the motivation behind his lunar landing program, simply stating that "the Soviet Union has made this a test of the system. So that's why we're doing it."[109] Perhaps most significant, is further proof of Kennedy's commitment as a Cold Warrior. When the public outrage demanded national retribution against the Soviet Union, Kennedy listened and reacted to the fervor. This is further evidenced at the premature end of Kennedy's presidency, when the national enthusiasm behind the Moon landing waned in light of the success of Project Mercury.

Despite Kennedy's Moon landing announcement and warning to Congress about the cost of the endeavor, the election of 1964 and the challenge to cut the nation's budget became a major concern after Project Mercury. NASA's funding was in danger of losing support due to a perceived lack of progress in accomplishing a lunar landing. By 21 September 1963, the Soviet space spectaculars that encouraged the national press and the public to embrace a Moon program had not continued. With the fuel stripped from the fire, the technology of the Soviet Union appeared as less of a threat because it was out of the public mind. As a result, Kennedy and Webb sought for other ways to "get over the hump." Kennedy commented that he could justify NASA's expenditures in a "military or national security route" rather than prestige.[110]

Another solution came a little over a week later when Kennedy proposed a joint-Moon landing effort with the Soviet Union at the UN General Assembly. A joint mission would not

---

[108] National Aeronautics and Space Administration, "Transcript of Presidential Meeting in the Cabinet Room of the White House," November 21, 1962 <http://history.nasa.gov/JFK-Webbconv/pages/transcript.pdf> (accessed March 1, 2015), 16-17.
[109] Ibid., 16.
[110] John F. Kennedy, "JFK Library Releases Recording of President Kennedy Discussing Race to the Moon," John F. Kennedy Presidential Library and Museum <http://www.jfklibrary.org/About-Us/News-and-Press/Press-Releases/JFK-Library-Releases-Recording-of--President-Kennedy-Discussing-Race-to-the-Moon.aspx> (accessed March 1, 2015).

only decrease expenditures, but allowed Kennedy to follow through with his Moon landing announcement. Additionally, it followed other cooperative efforts that resulted from the Cuban Missile Crisis a year before.[111] This outreach stirred consternation from the Congressional Cold Warriors who supported competition with the Soviet Space program and pledged their support to Project Apollo. For Kennedy, it offered a possibility of escaping the confines of a competitive goal and an increasing budget to accomplish that goal. The offer of cooperation then, was a viable tool to accomplish a political goal.

Khrushchev deflected the U.S.-USSR joint proposal. In fact, the Soviet Union had not committed to a manned Moon program publicly. Khrushchev had more to lose by accepting. The Cuban Missile Crisis, some critics say, was the first incident in which Khrushchev began to lose sway in the Communist Party.[112] The result of the crisis, the withdrawal of missiles from Cuba, was looked upon as weak and seen as backing down from U.S. pressure. In the wake of the crisis, the Partial Test Ban Treaty was signed by the USSR and U.S. that eliminated underground and deep sea nuclear testing. Another accord prevented the militarization of space, the Peaceful Uses of Outer Space, which served as the later basis for the 1967 Outer Space Treaty.[113] Soviet preeminence in space would have been undermined in a cooperative effort. In the United States, according to Walter McDougall, the proposal also helped to provide a variety of effects. First, unusually it prompted the Senate to pass a rider that stated a joint effort could not be made without their consent, which allowed the Apollo program to "survive extinction." But it did not prevent a budget cut; NASA lost a half a billion dollars of funding that pushed the

[111] Logsdon, *Kennedy and the Race to the Moon*, 176-177.
[112] Edmonds, Robin, *Soviet Foreign Policy: The Brezhnev Years* (New York: Oxford University Press, 1983,) 34-37; LaFeber, 225-227; although Khrushchev himself believed it began with the U-2 incident. Taubman 446-447
[113] Detlev Wolter, *Common Security in Outer Space and International Law* (United Nations Publication: Geneva, Switzerland, 2006,) 12-13.

already tight end of decade lunar landing deadline to 1968-69.[114] Nonetheless, Kennedy helped save the program through this transition time of 1963-1965. Kennedy's death in 1963 in a sense also cemented the future of Apollo. The speeches made before Congress and at Rice University in 1961 and 1962 respectively enraptured the American public with the dream of landing on the Moon. When Kennedy was assassinated, the American public was uncertain, Congress did not want to spend the money, and the lack of Russian achievements made the Moon landing less of a priority. It seemed fitting then that the Moon landing became part of a tribute to Kennedy's legacy. He advocated it passionately publicly, while privately he was at best disinterested in space. Kennedy did not live to see Apollo accomplish his goal of man on the Moon "before this decade is out," but his successor who Kennedy appointed to lead NASA's Space Council was well-positioned to continue the job.

By May 1963, Project Mercury was successfully concluded. The project launched six of the seven original NASA astronauts into space, two of them in sub-orbital flights, the other four made complete passes around the Earth. Although the United States responded to the precedent set by Gagarin, total space flight time and number of orbits completed by the Mercury astronauts lagged behind that of the Soviet Union. In response to Kennedy's call for a race to the Moon, NASA envisioned a program to fill the gap between Mercury and the Apollo Moon landing. Project Gemini was approved twenty years to the date after Pearl Harbor. Gemini's purpose was to familiarize NASA and the astronauts with advanced space exploration techniques that were vital to the Moon landing. Five objectives were envisioned for the project, but two in particular became firsts for the Americans and were necessary steps to a Moon landing.[115]

---

[114] McDougall, 395-396.
[115] Barton C. Hacker and James M. Grimwood, *On the Shoulders of Titans: A History of Project Gemini* (Washington, D.C.: National Aeronautics and Space Administration, 1977,) 55-56; Roger Launius, "First

First, Gemini focused on studies of the body's effectiveness in outer space. Extra-vehicular activity (EVA) was the most obvious un-tested component of a Moon landing, comprised of an astronaut exiting the vehicle and performing work on the spacecraft or studying the environment. Along with EVA's, NASA hoped to understand the effects on the human body in outer space for prolonged periods of time. A shot to the Moon comprised of a six day round trip flight, not including time to perform scientific experiments and collect samples. The longest time a Mercury astronaut spent was a little over a day in space. Gemini called for one to two week duration flights. Once again, the Soviet Union outshone the United States, and performed the first successful "spacewalk" on 18 March 1965. And once again, the United States responded with their first successful EVA by astronaut Edward White three months later.[116] Gemini astronauts did however, set an endurance record with the fourth manned flight, which stayed occupied for thirteen days and eighteen hours.

The second objective dealt with piloting precision. In the initial planning stages of Apollo a great debate took place between NASA engineers on how best to land on the Moon. Three options were proposed, two of which required astronauts dock with another spacecraft mid-mission. When it was decided that the lunar landing would require the astronauts to ascend from the Moon and meet with a spacecraft orbiting above, NASA developed systems and procedures for the "rendezvous" of two separate spacecraft in Earth orbit before applying the technique to lunar orbit. The first space rendezvous was completed in December 1965, and was the first notable American achievement that the USSR had not already accomplished. Throughout the course of Gemini, several EVA's were conducted and three astronauts performed multiple EVAs during their mission. Project Gemini was the turning point in Kennedy's race to the Moon as

---

Steps into Space: Projects Mercury and Gemini," in *Exploring the Unknown Volume 7: Human Spaceflight: Projects Mercury, Gemini, and Apollo*, 37.

[116] Hacker and Grimwood, 240-241.

NASA began to pull ahead of the Soviet Union. Despite the first EVA by the Soviet Union in March, it also became the only EVA performed by the Soviet Union for nearly four years.[117] This was due to the reactive mindset of the Soviet space bureaucracy which limited the productivity of Soviet engineers.

Following NASA's announcement of Project Mercury in 1959, a manned program was approved in the USSR. But unlike the United States, the Soviet Union failed to create a singular organizational body to direct space efforts and establish long term space goals. In effect, the lack of a structured body limited Soviet space projects to be merely reactive. While the USSR had approved of lunar probes and a manned mission, these programs were created after the American announcements to do the same. Despite the prestige garnered from early successes in Soviet space exploration, party leaders failed to commit to a long term Soviet space policy.

Soviet leaders realized they simply needed to "hold the line." Their space successes left the United States scrambling to create a program to match the precedent set. So when space efforts were not directly related to military development, they simply had to beat the Americans to their own space goals. This is true in the cases of Sputnik and Gagarin, as well as the EVA flights proposed by the United States for Project Gemini. It is also highlighted in the fact that a USSR spaceplane was approved, as a counterpart to the American project Dyna-Soar, a piloted satellite and missile interceptor designed to operate in both air space and outer space. Though the U.S. program was ultimately cancelled, knowledge of the project reached the Soviet Union as early as 1957 and the Soviet State Committee pushed the Defense Ministry to create a Soviet equivalent to "keep up" as a necessity of competition.[118]

[117] Siddiqi, 460.
[118] Siddiqi, 225, 242.

The lack of a cohesive body to direct space policy entrenched Soviet space projects in bureaucratic delays. The link between missile development and space projects further restricted Soviet scientist's goals for outer space. When plans for ICBM or space-orbiting vehicles were made, the USSR sponsored competition between design bureaus by approving multiple plans in multiple departments to direct research and development at the same time as one another. The competition for research approvals stretched resources too thin. Rather than promote an atmosphere of cooperation, the battle for research rubles pitted scientists, party officials, and military officials against one another. When proposals for space projects originated from designer Korolev and others, the proposals bounced around various levels of bureaucracy in the Soviet government. After the launch of Sputnik II in 1957, Korolev formulated documents with the intent to establish a NASA-like organization, but because Soviet space projects were so entrenched in military development, Korolev's wishes fell onto deaf ears. The requests continued through 1959 to form a Soviet Space Program, as NASA had already organized for the United States.

When the first Soviet satellites launched, Korolev enjoyed the luxury to create a space project and follow it to the end. Korolev effectively had Khrushchev's ear when he wanted to commence another space mission following the successful Sputnik. But by the end of the 1950's, he began to lose favor with Khrushchev. The Communist Party leader wanted a scientist focused on missile development. In the development of an alternative fuel source for a new ICBM, Korolev was unable to adequately solve the issue for Khrushchev. That led the leader to remark to his son that Korolev's purpose would rather be spent on space than defense.[119] The idea of a space program, though envisioned by Korolev, was considered by Soviet Party members but ultimately rejected on the grounds that it would interfere with missile development. It was the

[119] Siddiqi, 214.

response from Senator Lyndon Johnson following Sputnik that edged the Soviet Union party leaders to more closely consider space objectives.

After the New Year in 1960, Khrushchev met with Korolev, and soon-to-be president of the USSR Academy of Sciences, Mstislav Keldysh. In this meeting it was determined that despite the United States' wish to emphasize the civilian nature of NASA, Soviet leaders found Johnson's comments reflected the true nature of the United States' motivation into space: "Control of space means control of the world." Comments by Johnson and others suggested a military nature of the U.S. space program. Khrushchev saw this as a direct threat and assured the two scientists that long term space goals, especially those that emphasized defense projects, would be explored. By June of 1960, Korolev's previous proposals on manned flight, lunar and planetary probes, and low earth orbit projects, i.e., space stations, were approved by the Central Committee and the Council of Ministers.[120] Korolev's proposals did not include the creation of an organization to direct space efforts nor did it attempt to separate civilian from military aspects of space, but it most definitely committed the Soviet Union to space endeavors to challenge the United States.[121]

When it was announced that the Mercury program would place a man into sub-orbit, the Soviet Union worked prodigiously to trump the American program by placing a cosmonaut into full orbit. It was announced on 4 June 1960 that the Soviet Union was set to complete testing on a manned flight by the end of the year. A number of notable Soviet achievements including Gagarin's successful flight and the first Soviet EVA, as well as the first dual flight of two craft at the same time, and the first woman cosmonaut in space maintained the symbolic lead in favor of the USSR in space activities. The lead was challenged by the American Gemini program, as the

[120] Siddiqi, 238-239.
[121] Siddiqi, 205-242.

Soviet Union accomplished EVA and multiple craft flight first, but Gemini astronauts participated in more EVA's, increased human spaceflight time, and set a new record in continuous manned spaceflight.

More importantly, the end of the Gemini program signaled the end in the reactive strategy of the USSR. The pattern of a U.S. announcement for a space spectacular and a Soviet response by pre-empting the American attempt no longer became a viable option to run a space program. The long term goals that Khrushchev eagerly authorized for Korolev were accepted by the Council of Ministers in the Soviet Union in June 1960. A year later, those goals were retracted, approximately a week before Kennedy declared to Congress that the United States will go to the Moon. The funding that Korolev received for his long term space goals was removed and re-allocated to a competing designer.[122] In the case of a Moon landing, rather than follow the United States' lead on a project and beat them to it, funding was allocated to other areas of missile and orbital spaceplane projects.

Soviet Vostok flights were not completely abandoned. Motivated by John Glenn's successful Earth orbit in February 1962, the Soviet Union worked to outshine any American accomplishment. Despite the prestige gained from space spectaculars, the Communist Party remained steadfast in ensuring that space policies coincided with military developments. As long as the Soviet Union could assert its dominance in space, there was no need to continue "running a race" in which they consistently placed first. This mode of thinking changed by 1963, Soviet spaceplane plans were cancelled, a move that coincided with the end of the United States' Dyna-Soar. According to Soviet Space program historian Asif Siddiqi, "architects of the Soviet space

[122] Siddiqi, 309.

program finally began to take notice" of the United States and the progress that was made in reaching the lunar surface.[123]

As early as spring 1962 the scientists of the Soviet Union first considered circumlunar flight before a manned landing mission. As envisioned, the plan was put on hold until December 1963. It also called for a new spacecraft, the Soyuz, to replace the outdated Vostok. Despite a decree from the Communist Party and the Council of Ministers, the Soyuz was underfunded and did not become a priority development. The Soviet Union relied on the rest of its Vostok fleet to continue manned space operations until the Soyuz was ready, projected completion was around 1965. As the Vostok flights continued, the Soviet Union took a philosophy that space flight always had to outdo the previous flight. Gagarin's flight was succeeded with a day long flight, the day long flight succeeded by a dual flight, and that succeeded by a dual flight with man and woman in space. These missions did little to work toward a far reaching goal. Any scientific takeaway from the project was limited to the human condition in outer space. It was this obsession of maintaining a lead, but failure to work toward a long term goal that ultimately let the space prestige of the Soviet Union slip to the Americans.

Early in 1964 it became apparent that the American Gemini program was to make great leaps in manned spaceflight over the Mercury program and the Soyuz was not projected to be completed until the end of 1964 or even 1965. When NASA released in March 1964 that the Gemini had a crew of two astronauts and was set to make spacewalks, the Soviet Union abandoned its final Vostok flights and modified the craft to create a new cabin that supported multiple passengers. The revised craft, the Voskhod was slated to fly five months after its conception, in August 1964. But the slow development of the Soyuz and the alarmingly quick progress of the American Apollo, for the first time concerned Korolev that the United States was

[123] Siddiqi, 337.

to pass the Soviet Union. The Saturn rocket greatly outmatched anything in the Soviet arsenal at that time, both physically and conceptually. In May 1964, the Americans launched the first dummy Apollo spacecraft into Earth's orbit. Within two months, the Soviet government finally issued a response to Apollo; that two projects would be funded to compete with the Moon landing goal established by President Kennedy three years earlier. [124]

The Voskhod program launched two vehicles, Voskhod 1 and 2 in October 1964 and March 1965. Once again, the programs bested the Americans by sending multiple cosmonauts into space and on Voskhod 2, the first extra-vehicular activity, or spacewalk. Despite these victories, significant steps to beating the Americans to the Moon were at a standstill after 1965. During the flight of Voskhod 1 in October, Nikita Khrushchev was ousted from power and placed under house arrest while the spacecraft orbited the Earth. Surprisingly, it was during the Voskhod program in March 1965 that a ministry responsible for space efforts was centralized. Rather than being spread across bureaus in the defense, air force, and various industrial ministries, the Ministry of General Machine Building came to oversee all missile and space related projects in the Soviet Union. This in turn significantly changed the way in which space projects were carried out. Before, scientists and designers of missiles and spacecrafts lobbied and appealed to high ranking government officials to fund their projects, those approved proposals then moved to various councils and ministries to acquire missiles, spacecraft, instrumentation, etc., that eventually coalesced into a launch effort. Managers of Ministry of General Machine Building received requests, then sent the requests to the defense ministry, which then approved the proposal, with the support of Communist Party leadership. When the approved program returned to the Ministry of General Machine Building, all space related industries (rocket, craft,

[124] Siddiqi, 408.

instrumentation, etc.) fell within their jurisdiction, and they implemented the approved proposals.[125]

The organizational effort unfortunately for the Soviet Union was too little too late. The Soyuz spacecraft meant to replace the Voskhod was inevitably delayed in favor of other projects in 1963 and was not formally re-assigned a testing phase until August 1965, four years after the Saturn missile and Apollo spacecraft were first tested.[126] The first Soyuz manned test, Soyuz 1 ended in tragedy. The capsule and its pilot, Vladimir Komarov launched into orbit 23 April 1967. The mission's intent was to rendezvous with Soyuz 2, who awaited orders to launch as Komarov circled above. Essentially, the mission was to replicate the Gemini 6A/7 carried out by the United States a year and a half prior. Technical difficulties with the Soyuz 1 prevented the launch of Soyuz 2 and upon early re-entry of Komarov's capsule, the parachutes failed to deploy and Komarov plummeted to the Earth. It was the first public accident of the Soviet space program and the unveiling of the Soyuz program. The United States suffered its own public loss just two months earlier in the first manned Apollo mission: Virgil Grissom, one of the original Mercury Seven, Ed White, the first American to walk in space, and Roger Chaffee, who served as back up for the Gemini missions who was prepared to fly his first mission as an astronaut, lost their lives when a fire broke out in the capsule of Apollo 1.

Even had the Soyuz begun development in 1963, the other issue facing the Soviet scientists and particularly plaguing Korolev, was the lack of an adequate launch vehicle to take the Soyuz to the Moon. As with other Soviet space projects, Korolev's missile was funded along with another competing missile that thinned the resources and production of each. When

[125] Siddiqi, 428-436; Courtney G. Brooks, James M. Grimwood, and Loyd S. Swenson Jr., *Chariots for Apollo: A History of Manned Lunar Spacecraft* (Washington, D.C.: National Aeronautics and Space Administration, 1979,) 381.
[126] Siddiqi, 474.

Brezhnev assumed power in 1964, Korolev's missile was chosen as the sole launch vehicle for the Soyuz program. The early Soyuz flights that remained in Earth orbit used a smaller variation of the proposed missile. Full testing of the N1-L3 launch vehicle, the Soviet Union's delivery vehicle to the Moon, did not commence until 1969. The N1-L3 was the USSR's answer to the American's Saturn V, but only started testing as the Americans geared up for the Moon landing. When testing of the complete rocket assembly commenced between 1969 and 1972, the lack of a successful test in four attempts completely put the rocket out of production. Without a rocket that supported manned flight to the Moon, the Soviet Union was simply out of a race in which the winner was declared by a lunar landing as early as 1967.

By and large, for much of the period known as the "space race" the United States competed against itself. The United States step-by-step progressions to the Moon were challenged by their Soviet counterparts through the early to mid-1960's. The open nature of the NASA program allowed the Soviet Union to view and accomplish for themselves the goals of the American astronauts and snatch the prestige of being the first out from underneath them. Because of the reactive nature of the Soviet space program, the Soviet Union did not officially declare a lunar orbit or manned lunar landing goal until the mid-1960's. The lack of an official announcement does not indicate that the Soviets were not interested in such a goal, however.

When the Soviets finally accepted the challenge to land on the Moon, they were faced with tremendous setbacks due to technological, organizational, and accidental circumstances that precluded any situation in which they could regain the lead. As the United States completed Project Gemini, the middle act of the Moon landing production, the Americans surpassed the Soviet Union in regard to significant steps toward a Moon landing and maintained the symbolic lead in a symbolic race against the USSR. The Soviet Union's main technological problems: lack of a delivery vehicle and the lack of a suitable spacecraft coupled with the death of the greatest

promoter and head of all significant Soviet space achievements, Sergei Korolev, allowed the United States to surpass the Soviet Union by becoming the first nation to land on the Moon on 20 July 1969. Six hours later, astronauts Neil Armstrong and Buzz Aldrin became the first humans to walk on another celestial body "for the benefit of all mankind."[127]

Soviet officials attempted to downplay the prestige value the United States gained from the Apollo program, as early as December 1968 when the United States orbited the Moon for the first time during Apollo 8. Immediately, members of the Soviet Academy of Sciences and officials affiliated with the Soviet space program downplayed the lack of a Soviet "answer" to Apollo. They also denied that the Soviet Union was involved in a manned lunar program, despite proclamations to the contrary from Academician Sedov, Khrushchev, and Brezhnev. Similar to the situation John Kennedy faced when he questioned Vice President Johnson in April 1962, the Minister of General Machine Building asked senior space officials how the success of Apollo 8 could be neutralized and in what other ways the Soviet Union could overshadow an American Moon landing.[128] The answer was in an automated Moon landing that collected lunar samples and returned to Earth before the Apollo astronauts made contact. Technological failure, however, prevented that from happening before Apollo 11 touched down. Months after the first Moon landing, the USSR successfully flew three Soyuz capsules in Earth orbit; Brezhnev announced that the future of Soviet space is in Earth orbiting laboratories, i.e., space stations, and that the Soviet spacecraft "are ships of science." In an attempt to re-image the Soviet space program, Brezhnev suggested that Apollo and the entire U.S. effort was solely a political affair, while the USSR had always been focused on the scientific aspects of space flight.[129]

[127] This phrase is inscribed on the plaque that Armstrong and Aldrin placed on the moon
[128] Siddiqi, 674-675.
[129] "Brezhnev says Soviet is Following Main Road in Space," New York Times, October 23, 1969, 20.

The failure to land on the Moon profoundly impacted Soviet scientists and engineers who worked in space programs. The Communist Party failed to commit their entire spaceflight efforts into this single project. As a result, a number of space programs received funding and support, rather than funneling all of their resources into a single project. This issue was further confounded by both Korolev and another designer working on two separate rockets, both of which were intended to take cosmonauts to the Moon.[130] The Soviets inability to combine resources and talent hindered the success of a complicated space project such as the Moon landing. For some of the Soviet space dreamers, the lack of a Moon landing caused a great despair: a feeling that the Soviet Union could not compete with the United States.

The Apollo manned lunar program continued until Apollo 17 returned to Earth in 1972. Six crews made the lunar trip and another performed a circumlunar "fly-by" to return safely to Earth when a malfunction made a lunar landing impossible. The program began at the discretion of President John F. Kennedy in an effort, according to NASA historian Roger Launius, "to deal with an unsatisfactory situation."[131] That is to say, Soviet achievements with Sputnik, early lunar probes, and the flight of Yuri Gagarin, combined with no or slow U.S. responses to those scientific challenges, portrayed the United States as slow and backward in science and technology. Even worse, the military implications of the space program, specifically the use of rockets and reconnaissance satellites, created an illusion of inferior national security. Kennedy made U.S. space preeminence a national goal in the beginning of the decade, but by 1963 public opinion and rising project costs interfered with the decision to go to the Moon. At this time, Kennedy requested a cooperative effort between the two superpowers but nothing came to fruition.

---

[130] Siddiqi, 408.
[131] Launius, *NASA: A History*, 65.

When Johnson assumed office in 1963, he largely remained focused on competition with the Soviet Union in space matters. Declining relations with the Soviet Union meant there was little hope to cooperate as Kennedy had proposed prior to his death. A proxy war, a staple of the Cold War struggle for the balance of power, by this time had engulfed the United States into full scale war in Southeast Asia. The subsequent overthrow of Khrushchev and a new premier's ascendance to power meant that the Cold War would continue to be dictated by ideology. In turn, this kept the Soviet space program and the United States' NASA in competition. Following a string of early victories in space achievements, the Soviet Union started to lag behind the United States. While the United States had planned a goal and prepared to complete it by the end of the decade, the Soviet Union did not have a long term plan or effective direction from Communist Party leaders. The disorganization of the Soviet space program and its inability to dictate its own long term space goals relegated the program to a slump of activity from 1964 to 1972.

Continued Soviet space failures into the 1970's helped further the recognition of NASA as the world's pre-eminent space power. Two manned projects, Soyuz 1 and Soyuz 11, resulted in Soviet fatalities and along with premature rocket explosions and failed Moon probes. Damage was inflicted on the Soviet ability to complete a space mission. As a result, the sole project related to Soviet's conquest of the Moon was cancelled in 1974. But the USSR found other areas in which to regain some measure of success. In the early 1970's, increased attention in the Soviet program was given to automated instruments. Within this program, the Soviets eventually sent probes to the Moon that returned with lunar samples. Although the Apollo flights that continued during this time overshadowed the Soviet success, it helped re-instill the confidence that was lacking in the Soviet space program.

In ten years the fortunes of the United States and Soviet Union changed. The American program peaked with the completion of the Apollo program, as the Soviet Union failed to make

any significant gains. The new decade also brought about a new tactic in the Cold War. When Richard Nixon assumed the presidency in 1969, he took over an office embroiled in an ideological war. Kennedy's attempt to cooperate in space with the Soviet Union in 1963 was a political tool to resolve a dilemma between falling public support and Congressional budgeting. Cooperation in the Nixon administration was treated much the same. Ending the unpopular Vietnam War offered Nixon and his political ally, Henry Kissinger and opportunity to foster international relations on the basis of peace. Détente, as it were, focused on cooperation in areas in which the United States and Soviet Union held particular interests. In an effort to break down the barriers between the superpowers, détente took the competitive arenas in which the United States and Soviet Union were engaged, and sought a cooperative goal or mission in which the two nations could work together. As one of the arenas of competition, the space programs of the United States and Soviet Union were among Nixon's priority for a cooperative agreement.

CHAPTER THREE

DÉTENTE AND COOPERATION

The late 1960's was a period of great turmoil. Globally, revolutions challenged the rule of monarchies and democratic governments. At times, these uprisings were characterized by left wing radicals that intended to topple a long standing ruler. In the midst of the Cold War, these revolutions characterized the struggle between the United States and USSR. That is, pro-democracy forces against communist or socialist forces. Domestically, the Civil Rights Movement and American involvement in Vietnam caused the younger generation to speak out against government actions. American-Soviet relations continued to falter after the Soviet Union invaded Czechoslovakia in August 1968 to tighten their control over the satellite that was challenging the ideologies of the Communist Party.[132] In addition to the internal problems of the Cold War rivals, increased arms development and the invention of the Multiple Independently Targetable Re-entry Vehicle (MIRV) and the Anti-Ballistic Missile (ABM) defense system accelerated the long standing arms race between the two countries. The MIRV missile contained several warheads capable of striking a group of targets in one launch. The ABM, while a defensive system that shielded each nation from a missile strike, essentially encouraged the production of offensive weapons to offset the defensive capability of the enemy nation.

Peculiarly, it was in this period that the United States and Soviet Union were able to pursue cooperation in a number of areas. International cooperation in space with the Soviet Union fit neatly into the policy of détente pushed by Nixon and his National Security Advisor, Henry Kissinger. Détente became a new tactic in the Cold War after military, cultural, and diplomatic attempts failed to relieve tension in the Cold War. Nixon's détente was a remarkably

[132] LaFeber, 256-258.

different method of foreign policy from his predecessors. Rather than competing with the Soviets on a pound for pound basis, the Nixon Administration accommodated the requests of the Soviet Union. It was believed that if the Soviet Union and the United States or other Western democracies were able to cooperate in scientific, agricultural, or cultural areas in which they shared a mutual interest, then the political and economic systems would follow suit. In doing so, Nixon and Kissinger hoped presenting the Soviet Union with the carrot rather than the stick would prod the USSR toward international cooperation.

In the case of space, détente gave the United States government the opportunity to continue a space program based in its own interest in the post-Apollo period. Just as the American government took a more active role in directing space policy in response to Gagarin's flight in 1961, the executive branch looked for ways to cooperate in space after the Apollo. Because détente was Nixon's method of foreign policy in 1969, he sought a way to incorporate that foreign policy decision into the space program. For the Soviet Union, détente was an opportunity to achieve status quo, an equal role in bargaining that in turn made the Soviets more responsive to "cooperative co-existence." In doing so, the United States had to willingly restrict the production of nuclear armaments and re-assess its policy of containment in order to bring the Soviet Union to the bargaining table. In doing so, the United States conceded their long-held position on disarmament in order to get the Soviet Union to cooperate.

A concession by the United States in the production and inventory of nuclear arms was a long held position by the Soviet Union. In the Eisenhower, Kennedy, and Johnson eras, disarmament was a barrier to Soviet cooperation. Nixon, perhaps under the advice of Kissinger, was interested in cooperation with the USSR in space from the outset.[133] Cooperation in space

[133] Arnold Frutkin, interviewed by Rebecca White, Washington, D.C., January 11, 2002, 47-48; Nixon also shared these sentiments with Apollo 8 Commander, Frank Borman as he prepared for a two week trip of

also held the secondary benefit of providing inside knowledge of the secret U.S.S.R. space program. Aboard Air Force One en route to view the splashdown of Apollo 11, NASA Administrator Thomas O. Paine, Nixon, Kissinger, and Secretary of State William P. Rogers met informally on the subject of cooperation with the Soviet Union in space. Paine had been corresponding with members of the USSR Academy of Sciences, in the hope that some sort of rapprochement could be reached between the space programs. Nixon stated his position on cooperation and made it clear that he considered the role of collaboration in space a foremost foreign policy goal. He urged the continued effort of Paine in communicating with the Soviet Union.[134]

From Paine's perspective, NASA faced a considerable identity crisis after Apollo. Paine later admitted that the manned program was created to deal with "the Russian threat" and "that the time had come for NASA to stop waving the Russian flag."[135] The United States' symbolic victory required significant economic investment. Approximately twenty two billion dollars was invested into NASA's manned spaceflight projects by the conclusion of Apollo in 1972. NASA's expenditures, along with the rising costs of the Vietnam War and President Lyndon Johnson's Great Society social programs, caused concern for many in Congress and the public over increased government spending. As NASA fulfilled its promise to land a man on the Moon, proponents for space exploration were met with opposition from the Bureau of Budget over post-Apollo funding.[136] The manned lunar program was the most visible and exciting NASA project of the 1960's. It overshadowed NASA's work in unmanned and low earth orbit projects, i.e.,

---

Europe in June-July, 1969. Frank Borman, Frank Borman to Edward C. Ezell, August 20, 1975, Ezell's ASTP Log Notes, Folder 3, Johnson Space Center, Historical Reference Collection, Houston, TX.

[134] Thomas O. Paine, "Man's Future in Space," March 14, 1972, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX; "Editor's Note," in *Exploring the Unknown Volume 2: External Relationships*, 40.

[135] Thomas O. Paine, interviewed by Gene Emme, Washington, D.C., September 3, 1970, 24.

[136] Bureau of the Budget, "National Aeronautics and Space Administration Highlight Summary," October 30, 1968, in *Exploring the Unknown Volume 1: Organizing for Exploration*, 496-497.

satellites and a useable space station. The manned program's utility as a foreign policy tool as established by President Kennedy and continued through Johnson, relied upon competition with the Soviet Union and made NASA a valuable political tool of the Cold War. But as Apollo achieved its goal, the government's reliance on NASA as a competitor was over. With the competition settled, the Johnson administration's Bureau of Budget targeted NASA due to the high cost of manned exploration. As it became clear that NASA was under the microscope of the Bureau of Budget and unable to avoid the loss of funding, specialists gathered on two occasions to re-evaluate NASA as a political instrument and provided recommendations for the next decade space exploration.

When Richard Nixon won the presidency in 1968, transition teams were established to help organize the new administration. Much like Kennedy in 1960, Nixon established a transitional team called the Task Force on Space to provide policy recommendations for the new administration. Chaired by Charles Townes, the Task Force on Space issued their recommendations to the President-Elect in January 1969. Among the conclusions the Task Force returned to Nixon were recommendations on manned planetary travel, development of new booster technologies, and the state of competition with the Soviet Union.

The committee recommended against manned planetary travel, instead it urged the administration to pursue unmanned programs. The Task Force favored unmanned probes to Mercury, Venus, Mars, and Jupiter in order to gain more information of the planets, rather than manned missions. Likewise, the Task Force found that the development of a space station and the development of a low-cost booster were costly in both time and money, and advised against such programs. The advisors approved a policy of competition with the Soviets, but changed the conception of competition from emphasis on space "firsts" to participation in the same areas as the Soviets. The United States won the race in the short term; the Task Force advised that space

activities should match those of the Soviet Union so as not to lose the lead. The group decided that competition must remain so that the United States was not to "abdicate unilateral capabilities to the USSR," in things like unmanned planetary exploration and space science. [137]

The task force on space did not discount cooperation entirely. They viewed cooperation with the Soviet Union as fortuitous in lowering costs of manned missions and lessened the role that prestige played in space exploration. The Task Force encouraged the use of Apollo hardware through its estimated program end in 1975, it advised Nixon not to pursue a low cost booster program due to a high cost of development. The application of old technologies, they recommended, would reduce the cost of new missions. Most importantly, the group foreshadowed the effect that the Apollo-Soyuz Test Project had under the policy of détente: that cooperation was "a force for political accommodation."[138] At the time, the president-elect's board recommended the establishment of a second group to analyze policy decisions after the inauguration. Richard Nixon followed the Task Force's final recommendation when he assumed the presidency later that month and established the Space Task Group to explore policy considerations for NASA moving forward to the 1970's.

The ad hoc committee created by Nixon in February 1969, consisted of four members and three observers. Group members included: Thomas O. Paine, acting Administrator of NASA, Robert Seamans, Secretary of the Air Force, Lee Dubridge, Nixon's first science advisor, and Vice President Spiro Agnew who chaired the group. Observers from the State Department, Atomic Energy Commission, and Bureau of Budget were also present in the meetings. Within the Group, NASA supporters met opposition from the Bureau of Budget and Lee Dubridge over

[137] Charles Townes, et al., "Report of the Task Force on Space," January 8, 1969 in *Exploring the Unknown Volume 1: Organizing for Exploration,* 501, 503, 505, 507.
[138] Charles Townes, et al., "Report of the Task Force on Space," January 8, 1969 in *Exploring the Unknown Volume 1: Organizing for Exploration*, 503.

the projects NASA would pursue in the future. Acting administrator Thomas Paine lobbied hard for a continuation of NASA funding of levels comparable to the Apollo program, but even more vehemently he fought for control of NASA programs. The last decade of NASA projects were determined according to the political need of the executive. Paine wanted NASA to control its own direction. Paine's new vision "force[d] NASA to face up to developing a space program and justif[ied] it on a basis other than competition with the Soviet Union." Paine understood that competition did not beget a space program in the long term.[139] Paine's hopes for in-house control were highlighted in a nine page memorandum to Nixon but he was later rebuked by the administration.[140]

After seven months of deliberation, the committee released a report in September to Nixon. The group acknowledged dissenters of NASA by stating that "increasing pressures" have resulted in the "re-examination of, and possible changes in, our national priorities." NASA was most vulnerable to these pressures as space exploration and projects stripped resources from more immediate projects. The group advised that NASA had to dream up new projects that reduced "costs for placing and maintaining man in space" and engaging in "new missions with greater emphasis upon science return." Echoing the Space Task Force, the report suggested NASA pursue low cost operations with existing technologies and to return to projects that emphasized scientific achievements over prestigious milestones. In essence, the Space Task Group advised that NASA should return to a position reminiscent of Dwight Eisenhower, by considering missions with intrinsic scientific value over projects that centered on the gain of prestige.[141]

---

[139] Paine, interview, September 3, 1970, 24.
[140] Thomas O. Paine, "Problems and Opportunities in Manned Space Flight," February 26, 1969 in *Exploring the Unknown Volume 1: Organizing for Exploration*, 513-519.
[141] Space Task Group, "The Post-Apollo Space Program: Directions for the Future," September 1969, in *Exploring the Unknown Volume 1: Organizing for Exploration*, 526-527.

The Group did not summarily dismiss the effect that prestige had on the public and in the international community. They confirmed that the race against the Soviet Union carried ideological implications. By its end, it garnered a favorable image of the United States in developing countries. To the rest of the world, the success of the Apollo program re-captured the U.S. position on scientific and technological supremacy. Apollo, the group noted "resulted in a new feeling of 'oneness' among people everywhere. It inspired a common sense of victory that can provide the basis for new initiatives for international cooperation." The group acknowledged the eyes of the world had been on the United States and the Soviet Union during the space race. A race, the group stated, that was only won in "the short term." [142]

Although the group noted the concern of the American public in regard to the Soviet space program was not as dramatic as in the preceding decade, the Soviets showed "capability for future achievements and dramatic missions of high political impact." Thus, the Space Task Group echoed the earlier task force and advised that the United States must "retain the identification of the world with our space program." The position of NASA as the world's premier space program, and the nature of its openness and accessibility, gave the U.S. "an opportunity for significant political effects on nations and peoples." Though no longer in an overt competition with the Soviets, the Space Task Group continued to believe that in the post-Apollo world, the international community looked toward the United States, and by extension, democracy, as capable of surmounting impossible odds for the improvement of the human race. That is, competition with the Soviet Union should continue not on a crash basis or decided by a

[142] Ibid., 528-529.

series of firsts, but rather, programs that reaffirmed national superiority and emphasized parity with new Soviet programs. [143]

In deciding the future of NASA projects, the Space Task Group agreed with the earlier Space Task Force.[144] The group also emphasized the balance between manned and unmanned programs. The recommendations of the group reflected the need for balance in NASA activities. The group identified a number of prospective projects to maintain NASA's status as a first rate space program: unmanned planetary probes, continuation of the Apollo program, and research of a reusable space launch vehicle. Within all these considerations, the group also stressed the need for international cooperation to cut costs on space exploration.[145]

The recommendation from the Space Task Group was not the first time that space cooperation with the Soviet Union was discussed. As shown in chapters one and two, as early as 1957 collaboration in space became a recurring theme in NASA doctrine and public addresses of the president. Through the Eisenhower and Kennedy presidencies, early attempts of meaningful cooperation were declined by the Soviet Union on the basis that information exchange would not take place until the United States agreed to nuclear disarmament. Even after the signing of the Partial Test Ban Treaty in September 1962, any substantial effort at cooperation was rejected. As the Space Race continued, State Department officials for the United States and members of the Soviet Academy of Science, who were believed to be responsible for the Soviet space program, congratulated one another on "firsts" and achievements, but the competition prevented cordiality from turning into something more meaningful. Although small in-roads were made to

[143] Space Task Group, "The Post-Apollo Space Program: Directions for the Future," September 1969, in *Exploring the Unknown Volume 1: Organizing for Exploration*, 528-529.
[144] They also disagreed with the earlier Task Force. The Space Task Group recommended that a manned planetary mission be pursued, though not on a crash basis like the Apollo program. Space Task Group, "The Post-Apollo Space Program: Directions for the Future," September 1969, in *Exploring the Unknown Volume 1*: Organizing for Exploration, 524.
[145] Ibid., 531-536.

cooperation such as the sharing of telemetry and meteorological data, the cooperation failed to mature to a substantial project. The end of the space race, a new president, and a new administrator of NASA were necessary to make cooperation with the Soviet Union a reality.

NASA was already equipped to negotiate international agreements. The global tracking network that the space program used to follow American satellites, weather balloons, and manned spacecraft was built upon NASA contracts with countries around the world. These stations served a practical purpose of tracking ships that orbited across the equator; coincidentally many of these sites were located in Africa and Latin America, two regions thought vulnerable to the pressures of Communism. Additionally, Intelsat, a global network of communications satellites was established in 1964 with the cooperation of countries around Europe, Asia, and the Americas.[146] While the Space Task Group encouraged further work with countries that NASA had already cooperated with, they went on to specify that now was the time that cooperation with the Soviet Union should be pursued more significantly. The Group found that barriers to the Soviet Union were political, not technical, and advised the new administration to work with the Soviets in a "series of graduated steps" that led toward a major collaborative effort.[147] Even before the report was complete in the fall of 1969, Thomas O. Paine, confirmed by Nixon as NASA's administrator went about organizing for cooperation with the Soviet Union.

It took nearly six months for Nixon to formulate his space policy. In March 1970, he addressed the nation on the future of space programs. The message of balance brought forth by the Task Force on Space and the Space Task Group rang immediately in Nixon's opening observations regarding the direction of the space program. He stated the Apollo program would carry on as planned while greater emphasis was placed in unmanned probes to distant planets and

[146] A. E. Gotlieb and C. M. Dalfen, "International Relations and Outer Space: The Politics of Cooperation" *International Journal* 25, no. 4, (Autumn 1970): 687-690.
[147] Space Task Group, "The Post-Apollo Space Program: Directions for the Future," September 1969, in *Exploring the Unknown Volume 1: Organizing for Exploration*, 535-536.

system applications, i.e., satellites that provided tangible benefits to "man on earth." He emphasized developing a low-cost option of space travel, a concept that eventually became the decision to build the Space Shuttle. He also provided for the launch of an orbital space station that improved upon Skylab, an Apollo-era station that was scheduled to launch in late 1972. That decision was eventually abandoned as a result of budget cuts and resources re-allocated to the Shuttle.[148] Finally, Nixon emphasized a new effort of international cooperation, an effort that Administrator Paine actively pursued, the highlight of which became the Apollo-Soyuz Test Project.[149]

As President, Nixon wanted total control of foreign policy. In private, he denounced the Department of State and Foreign Service; the latter he alleged had rebuffed him as Vice President and ignored him after his term ended in 1960.[150] Nixon's philosophy on presidential action was expressed as early as 1960, when in a presidential debate he stated that "no president should allow anybody else to make the major decision. The president only makes the decisions."[151] This view resonated when he decided the future of NASA programs. The Space Task Group recommended the best course for the future of the space program to Nixon. The president used this board as an advisory group and implemented policy just as his predecessors, much to the chagrin of NASA Administrator Thomas Paine. Paine wished to break the cycle of presidential control over NASA's projects, and let the space administration chart the United States' space efforts, but was rebuffed by the president during the STG deliberations.

---

[148] T.A. Heppenheimer, *The Space Shuttle Decision: NASA's Search for a Reusable Space Vehicle* (Washington, D.C.: National Aeronautics and Space Administration, 1999), 190.
[149] Richard M. Nixon, "Statement About the Future of the United States Space Program," March 7, 1970, in *Public Papers of the Presidents of the United States: Richard Nixon 1970* (Washington, D.C.: U.S. Government Printing Office, 1971), 250-253.
[150] LaFeber 261; Henry Kissinger, *White House Years* (Boston: Little, Brown, and Company, 1979) 11, 15.
[151] John F. Kennedy and Richard M. Nixon, "First Kennedy-Nixon Debate," John F. Kennedy Presidential Library and Museum, September 26, 1960, <http://www.jfklibrary.org/Asset-Viewer/LYj_UVJ9gEyA5U9buPW8Hg.aspx>.

Despite the disagreement over NASA's project control between Administrator Paine and President Nixon, the former agreed with the administration that cooperation was to play a more prominent role for NASA in the 1970's: "I've tried to turn down this business of Russian competition and I've tried instead to build some bridges to the Soviets." Paine acknowledged that it was time for NASA to chart its own course, to "stop waving the Russian flag and to begin to justify our programs on a more fundamental basis than competition with the Soviets."[152] His view on control of NASA's programs contrasted with the Nixon administration who understood NASA to be a function of presidential policy and not an independent organization. Where Paine understood a joint mission with the Soviet Union as the natural move away from competition, Nixon saw it as a product of détente, a political move to open up the Soviet Union. Despite this discrepancy, Paine sought cooperation as he saw fit. When Paine was promoted from Deputy to Acting Administrator in October 1968, his correspondence with the Soviet Union spoke increasingly of cooperation between the superpowers. From sharing NASA management procedures to an invitation to watch the historic Apollo 11 launch, Paine attempted to use small courtesies to open the door to a larger venture. The Soviet Academy of Sciences accepted Paine's gift of NASA information readily, but politely declined Paine's overtures for visits and avoided any further steps toward full cooperation.

Paine's early attempts exemplified the way that international cooperation with the Soviet Union was slowly achieved. Eisenhower and Kennedy made overtures for cooperation from the executive branch and the U.N. These appeals from leader to leader were generally dismissed as rhetoric. Eisenhower failed to recognize this at the time, but Kennedy used the leader to leader cordiality to his advantage. Kennedy established a favorable exchange of letters with Khrushchev that called four areas of potential cooperation into question. The four proposals included: joint

[152] Paine, interview, September 3, 1970, 24.

weather satellite launching, exchange of spacecraft tracking services, joint testing of communications satellites, and a joint mission in which satellites would map the magnetic fields of space.[153] Of course, Khrushchev agreed with the caveat that nuclear disarmament take place.[154] Despite this request from the Soviet Union, Kennedy directed NASA Deputy Administrator Hugh Dryden to set about organizing for cooperation with the Soviet Union. Dryden led a panel of five U.S. delegates and met with five Soviet delegates headed by Anatoli Blagonravov met in New York for three days on 27, 28, and 29 March 1962. The bilateral discussions, both Dryden and Blagonravov affirmed, were preliminary only. The discussions continued favorably and the parties agreed to meet again in Geneva in May. Dryden traveled to Europe in May 1962 and completed an agreement in which the United States and Soviet Union agreed to cooperate on three projects: the exchange of meteorological and geomagnetism data, and an experiment in satellite communications.[155] Despite the appearance of cooperation, Arnold Frutkin later clarified in his book, the agreements provided for "*coordination* rather than *integration*."[156] (Emphasis in original) Moreover, the Soviets followed through with these agreements at a slow pace. Tracking data was provided, but inconsistent and provided meager results for the years of negotiation that Dryden spent. Coordination of efforts was achieved through NASA and the Academy of Sciences negotiations. Though these talks started at the executive level, NASA quickly picked up the ball and tried to get the Soviets to commit to cooperative ventures. Nixon and Paine followed this same tactic, using NASA, rather than the executive branch to come to an agreement with the Soviet Union.

---

[153] John F. Kennedy, "John F. Kennedy to Nikita Khrushchev," March 7 1962 in *Exploring the Unknown, Volume 2: External Relationships*, 147-149.
[154] Nikita Khrushchev, "Nikita Khrushchev to John F. Kennedy," March 20 1962 in *Exploring the Unknown, Volume 2: External Relationships*, 149-152.
[155] Edward C. Ezell, *The Partnership: A NASA History of the Apollo-Soyuz Test Project* (2010; repr., Mineola, New York: Dover Publications, 2010) 45-46; Frutkin, 95-97.
[156] Frutkin, 100.

Like Kennedy and Dryden, under Nixon the call for cooperation came not from the executive but the civilian agency ultimately responsible for space activities. Although Paine acted under the president's request, the outreach for cooperation from the agency "responsible" for all space activities seemed to hold more sway over the Soviet Union. In doing so, Paine and NASA began to tear down the barriers to a tangible cooperative effort that was traditionally rebuffed by Soviet diplomatic channels. The success of Apollo 11 furthered Paine's (and Nixon's) cause.

The inability of the Soviet Union to respond to the Apollo challenge completely swung open the door to a substantial cooperative effort. In the case of space, the Soviet Union stood more to gain through cooperation after Apollo. The lack of visible progress in space in the last half of the 1960's challenged the significance of early space successes. Automated Moon landing programs existed, but retrieved miniscule amounts of lunar material in comparison to the manned Apollo missions. The United States took the lead in space and the Soviet Union was unable to conduct any program or project that outshined the lunar landing. Association with the world's foremost space program seemed to be the next logical step. NASA was in this position prior to the success of the Gemini and Apollo programs and understood that the Soviet Union sought equality with the United States to justify its expertise in science and technology. Participation in a cooperative project with the United States offered the Soviet space program an opportunity to achieve a sort of parity with the United States. [157]

On behalf of Dr. Paine, Deputy Administrator George Low met with Mstislav V. Keldysh, President of the Soviet Academy of Sciences, in Leningrad in May 1970. The meeting coincided with an annual meeting of the International Committee on Space Research (COSPAR).

[157] Siddiqi, 792-794; "Ezell Log Note #41," Robert R. Gilruth, interviewed by Edward C. Ezell, Houston, March 25, 1975, Ezell's ASTP Log Notes, Folder 2, Johnson Space Center, Historical Reference Collection, Houston, TX, 2.

In his speech to the assembly, Keldysh signaled that the Soviet Union was becoming more favorable to international cooperation.[158] Privately, Keldysh and Low agreed to the consideration of a future cooperative mission. When Low returned to the United States he informed Paine of the Soviet response to the prospect of a joint mission. Responding to the Low-Keldysh meeting, Thomas Paine cabled Keldysh later that July with an opportunity for Soviet engineers to visit NASA facilities in Houston and examine designs for NASA's docking equipment and study the feasibility of a joint docking mission.[159] Paine sent a following letter that proposed the Soviet Union dock with the American space station, Skylab, scheduled for launch in November 1972. With talks of cooperation moving along smoothly, Paine wanted something tangible and achievable, a goal that showed the Soviet Union that the United States took cooperation in space seriously, and was readily available to begin working on a cooperative project immediately.[160] Paine never received a response from Keldysh.

Citing that he wanted more time with his family, Thomas O. Paine left government work and returned to the private sector in September 1970. At the time, his resignation was attributed to a greater opportunity at his former employer, General Electric.[161] One can only speculate how the conflict that existed between Paine and the Nixon administration played into his decision. Thomas O. Paine sensed a new direction for space exploration in the 1970's. His effort to get the Soviet Union on board with NASA led to the first cooperative mission in space. Paine wanted complete control over NASA projects and budget levels that were comparable to those sustained

---

[158] National Aeronautics and Space Administration, *Aeronautics and Astronautics 1970* (Washington, D.C.: NASA, 1972), 176.
[159] Ezell, *The Partnership*, *11*-12; the mission regarding a joint docking system originated between Keldysh and Philip Handler, President of the National Academy of Sciences, during the same May meetings in which Low visited with Keldysh.
[160] Thomas O. Paine, Thomas O. Paine to Edward C. Ezell, May 30, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX; Thomas O. Paine, interviewed by Robert Sherrod, September 10, 1970, 28.
[161] Thomas O. Paine, "Letter to NASA employees from Administrator Thomas O. Paine," July 28, 1970, <https://historydms.hq.nasa.gov/sites/default/files/DMS/e000037794.pdf>.

during the Apollo program. The favorable budgetary treatment that NASA enjoyed during the race to the Moon was completely gone after Apollo. Budget cuts halted production of the Saturn V and cancelled the final three Apollo missions—18, 19, and 20. Additional projects were delayed one to three years. In the wake of yet another protracted battle over NASA's falling budget allocations, Paine announced his resignation. [162]

Paine's hopes for NASA were ambitious: he wanted a Martian landing to be the next step in human space exploration. He felt that the time had come where NASA could put behind competition with the Soviet Union and operate on a fundamental scientific basis.[163] Paine felt that "dramatic public relations missions" i.e., astronaut visits to the developing world, were such obvious attempts to sway world opinion in favor of the United States that a cooperative space mission had to be free from politics.[164] Paine understood cooperation as the natural next step for NASA, as the new era of an Administration focused solely on science, and not used as a political pawn. When Paine left, Deputy Administrator George Low was named acting Administrator in the interim.

Shortly after Low was appointed, he received the response intended for Paine. Keldysh proposed a U.S. visit to Moscow. Reaffirming Paine's commitment to U.S. Soviet-cooperation, Low responded with a schedule for the proposed meeting that included information and systems exchange, feasibility studies of a cooperative venture, and prospective joint missions for the United States and the Soviet Union. The two sides agreed to a meeting at the end of October 1970. Low requested Robert Gilruth, Director of the Manned Space Flight Center in Houston lead the NASA delegation. Gilruth pulled personnel from Houston and Huntsville as well as

[162] Heppenheimer, 186-188.
[163] Thomas O. Paine, interviewed by Eugene Emme, Washington, D.C., September 3, 1970, 24.
[164] Thomas O. Paine, Interviewed by Robert Sherrod, Washington, D.C., August 14, 1970, 6.

Arnold Frutkin, Assistant Administrator for International Affairs at NASA Headquarters, to represent NASA in Moscow.

The October trip to Moscow resulted in the creation of Working Groups that combined American and Soviet scientists to work on individual components of the proposed joint docking mission. These working groups gathered materials to provide the other nation with specifics on instrumentation, guidance, environmental control, and other systems in order to solve technical issues and discuss the feasibility and procedure of docking two spacecraft through the creation of a new docking module. Alternating between Houston and Moscow, four working group meetings took place between June 1971 and May 1972.

To NASA Working Group #4 Chairman, R.H. Dietz, the differences between NASA procedure and Soviet procedures were glaring. For nearly the year and a half of preliminary working group meetings, only the Apollo module was discussed, and the Soviets never disclosed any information on their spacecrafts, but only hinted, rather than definitively stating, that if a mission were to take place, the then-untested Salyut space station would be used in the mission. In another working group, the Soviets appeared disinterested in an Apollo-Soyuz mission, and likened it to "a space stunt." The Soviets had greater interest in space vehicles of the future: they consistently requested information on the proposed Space Shuttle and referred to their own Salyut as the mission vehicle choice.[165]

By November 1971, the Soviet Union provided technical information to NASA officials that were pertinent to the success of a joint docking mission. The release of technical information

[165] Edward C. Ezell, "Ezell Log Note #17: Tape Transcript of Conversation with R.H. Dietz," July 3, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 2-3; Edward C. Ezell, "Ezell Log Note #16: Tape Transcript of Conversation with Bob White," June 10, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 1, 3; Edward C. Ezell, "Ezell Log Note #21: Conversation with Glynn S. Lunney," July 23, 1974, Ezell's ASTP Log Notes, Folder 1 Johnson Space Center, Historical Reference Collection, Houston, TX, 4; Edward C. Ezell, "Ezell Log #42: Interview with Caldwell C. Johnson," March 27, 1975, Ezell's ASTP Log Notes, Folder 2, Johnson Space Center, Historical Reference Collection, Houston, TX, 6.

was significant: it demonstrated to the United States that the Soviet Union was ready to fully commit to the idea of a joint docking mission. As a result of that meeting it was decided that it was technically feasible to dock an American spacecraft to a Russian space station. The November-December meetings showed that the Soviet Union considered the Salyut their vehicle of choice. Up until that time, discussion was largely docking-specific; American and Soviet specialists devised the best mechanism to lock two crafts together. At the end of 1971, the Soviet mention of using the new Salyut proved to NASA officials that they were ready to commit to a cooperative, tangible project. Six months later in Moscow, the exchange of information from the Russian delegation the previous November meeting and the submittal of an organized set of plans for the cooperative project that detailed the role each nation was to play in the joint mission proved that the most difficult preliminary barrier—the political differences of the United States and Soviet Union—was able to be overcome.[166]

George Low was present for the April 1972 Working Group meeting in Moscow. The Deputy Administrator was asked to make a cooperative space venture an agenda item for an upcoming summit between President Nixon and Soviet Premier Alexei Kosygin and Soviet leader Leonid Brezhnev. Low understood that the purpose of the April meeting was to try and come to some political agreement, that is, one that ensured the Soviet Union was interested in continuing these types of talks and to organize a mission plan. All the prior working group meetings were technical: devoid of any long term agreement or organization commitment from either side. When Low sketched out a twelve point organization plan that detailed mission roles and correspondence procedures, he faced little debate from the Soviet group, and largely found a common understanding. Both sides expressed their commitment to take place in a joint docking

[166] Edward C. Ezell, "Ezell Log Note #19: Conversation with L.S. Nicholson," July 16, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 3; Edward C. Ezell, "Ezell's Log Note #21: Conversation with Glynn S. Lunney," 2.

mission tentatively scheduled for 1975.[167] To reinforce the Soviet position, the Russian delegation also shared that between the November-December and this April meeting the Soviets abandoned the use of the Salyut space station as a result of economic and technical constraints.[168] Soviet scientists decided that the Soyuz spacecraft was more easily adaptable, flight tested, and available in inventory. Overall, the meeting went so positively that Low returned and informed the White House that a joint flight and mission profile was decided. Nixon and Kissinger could negotiate an agreement at the upcoming Strategic Arms Limitations Talks in Moscow the following month.

As the preliminary ASTP planning sessions were held between 1969 and 1972, American and Russian delegates partook in arms limitations talks in Helsinki, Finland and Vienna, Austria. In May 1972, Nixon and Kissinger met with Brezhnev and Kosygin to finalize arms agreements that were the source of the talks for three years. The Strategic Arms Limitations Treaty (SALT) capped the number of produced submarine and land-based nuclear weapons and established a prescribed number of anti-ballistic missile defense sites to two per country. Nuclear arms were the highlight of the mission to Moscow for President Nixon, but tucked into the two week trip were various other cooperative ventures that aligned with technological, scientific, and cultural exchanges as prescribed by détente.[169] On 24 May 1972, the United States and the Soviet Union signed the formal agreement that bound the countries to the joint mission that had been the subject of discussion for NASA representatives for three years, the Apollo-Soyuz Test Project.[170]

---

[167] "Summary of Results: April 4-6, 1972 Moscow Trip," Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX.
[168] "Chronology of Major Events: April 4-6- 1972," Box 1, Folder 1. NASA Johnson Space Center. ASTP Minutes of Meetings. John Burgess Facility, National Archives at Fort Worth, Fort Worth, TX.
[169] LaFeber, 271.
[170] The Apollo-Soyuz Test Project was the name NASA gave the mission, the Soviet side referred to it as the Apollo-Soyuz Experiment Program.

After the formal agreement was established, the Working Groups were reconfigured and met in July in Houston. The mission was planned for mid-1975. Understanding the technological and organizational issues that were involved, NASA officials decided that July 1975 would be a suitable time for launch. The Russian delegation pushed for the end of July. The first compromise of the ASTP was made when both groups decided to settle on July 15.[171] A quick compromise however, was fairly difficult in the early mission stages. In the words of Len Nicholson, assistant to Glynn Lunney: "The Russians do not seem to be able to generate a document without a major wrenching effort."[172] NASA officials were used to working at a high pace, in the words of Lunney, "a gung-ho approach," in which the design and build of the spacecraft was already decided, and the Americans looked to capitalize on getting this portion of the project completed as early as possible. The Soviets worked slowly and gradually, and preferred an experimental approach: building tests of ships and re-configuring the ships where deficiencies were found. These early goings created frustrations with both participants of the mission.[173]

Unfortunately, the formal agreement on a joint mission did not make information exchange any easier. Just as in the preliminary ASTP meetings, the Soviet Union's ability to contribute technical information to the joint mission continued to be constrained by the Communist Party. Information pertinent to mission success had to be released to NASA officials but first had to undergo a rigorous process through the Soviet bureaucracy to ensure the information handed over could not be used against the USSR in the event that political and military tension arose. Often, Soviet military and civilian space projects were built upon the

[171] Edward C. Ezell, "Ezell Log Note #21: Conversation with Glynn S. Lunney," 3.
[172] Edward C. Ezell, "Ezell Log Note #3: Notes on Brief Conversation with Len Nicholson," April 11, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 1.
[173] Edward C. Ezell, "Ezell Log Note #21: Conversation with Glynn S. Lunney," 4.

same launch systems, launch processes, and electronics unlike their American counterparts. Thus to give away this information meant to betray Soviet national security. In one instance, a request for information on transmission frequencies for Soviet electronics took over a year to be fulfilled to NASA officials, whereas the same information on the Apollo was handed over immediately.[174] To combat the inefficiency of the Soviets to provide paperwork and technical details, NASA officials played a more active role to ensure that paperwork did not bog down progress of mission planning. The Americans drafted technical documents and allowed the Russians to critique and approve them, to speed up the process. NASA engineers shared information freely with the Soviet Union, that exchange of information was perceived that NASA did not receive reciprocity of openness from the Russians.[175] To some at NASA, and in Congress, the one-sidedness of the information exchange in the years prior to the flight and the exceptional work load that NASA assumed was likened to a "grain deal in the sky."[176]

Of course, this situation ran contrary to the cooperative foundation of the Apollo-Soyuz Test Project. The Americans were aware that the Soviet Union continued to work under a high level of secrecy, but unaware of what exactly that secrecy entailed. NASA officials believed that Professor Bushuyev worked under the auspices of the Soviet Academy of Sciences, and thought him to be more of a mid-level manager, when in fact he was the deputy chief designer of all major manned spacecraft since 1954.[177] Behind the curtain, the Soviet Union operated from a government bureaucracy vaguely named the Central Design Bureau of Experimental Machine

[174] Edward C. Ezell, "Ezell Log Note #17: Tape Transcript of Conversation with R.H. Dietz," 2-3.
[175] Edward C. Ezell, "Ezell Log Note #11: Director's tag-up meetings for 26, 29, 30 and April," April 30, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 4.
[176] Edward C. Ezell, "Ezell Log Note #9: Conversation with Bob Overmeyer from the Astronaut Office," April 23, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 1-2.
[177] Edward C. Ezell, "Ezell Log Note #21: Conversation with Glynn S. Lunney," 5; Edward C. Ezell, "Ezell Log Note #27: Conversation with Dave Scott," August 21, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 6.

Building.[178] This department, in essence was responsible for all significant Soviet space firsts, including manned, unmanned, military, and civilian flights, beginning with Sputnik and under the direction of Korolev. At first, the department was responsible for the production of long range ballistic missiles, but through several re-organizations and under the guidance of Korolev and Bushuyev, the bureau grew to encompass space projects.[179] Yet, the Central Design Bureau of Experimental Machine Building remained unknown to the Americans.

This lack of openness in the early stages was interpreted by the NASA team as an embarrassment on the part of the Soviet Union for their systems and design programs. In several instances, the Soviet Union was not candid in their reasoning for requesting a mission change. In one example, Soviet engineers requested that the flight altitude be lowered but did not provide the reason for the request. After a bit of back and forth between the Soviet and American working groups, the NASA team confronted the Soviets and asked their counterparts if it was due to a weight issue and limitations imposed on the Soyuz spacecraft. After a bit of hum-drumming the Soviets responded in the affirmative. Clarke Covington, the NASA engineer who directly questioned the Soviets, later said "[t]hey seemed to embarrass easily about the capability of their spacecraft, which they had no need to do." Covington explained that the Apollo was over-capable for a mission such as this. But to the Soviet Union, they would rather have approached any issue they had with the mission as a technical flaw rather than explicitly admit to the Americans that the Soyuz had a problem.[180] The concerns of the Soviet Union were not entirely unfounded. Recent Soviet space launches were plagued with disasters that stood as an embarrassment to the capabilities of the Soviet Union. These missteps also reinforced uncertainty in the eyes of the American public to the value of the joint mission in 1973.

---

[178] Siddiqi, 520, 794, 848.
[179] Siddiqi, 40, 150.
[180] Edward C. Ezell, "Ezell Log Note #43: Interview with Clarke Covington," April 3, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 11.

American anxiety in the years building up to the launch of Apollo-Soyuz was further confounded by a perception of inferior Soviet technology. The first Soyuz mission in 1967 ended in a fatality when a parachute failed to deploy on re-entry, killing the cosmonaut upon a crash landing. In the midst of preliminary ASTP talks in 1971, the world's first space station, Salyut 1, was launched and subsequently visited by two manned Soyuz crafts. The first, Soyuz 10, was unable to dock due to mechanical and design issues and the mission forced to abort. The second, Soyuz 11 achieved a hard dock, but when the crew returned from their record setting twenty two day stint in the space station, a pressure valve failed to close upon re-entry and all three cosmonauts were killed due to loss of oxygen before the craft re-entered Earth's atmosphere. Salyut 1 was later de-orbited as the USSR redesigned the Soyuz craft in response to the tragedy. Subsequently, the Salyut 2 space station was launched in April 1973. Within days of attaining orbit, Salyut 2 malfunctioned, causing a decayed orbit and loss of the station shortly after a month of its launch. Another failure followed a month later when Salyut 3 space station burned all of its fuel reserves on its first orbit around the Earth. Again, the Salyut lost its orbit and burned upon re-entry into the atmosphere over the Indian Ocean.

Especially in the case of the Soyuz 11 disaster, Soviet delegates were guarded in revealing their space failures to their American counterparts. In the first group of meetings after the Moscow summit in 1972, Soviet delegates insisted that the docking module used to connect the Apollo to the Soyuz be virtually oxygen and nitrogen leak-proof. The Americans did not understand why the Soviets insisted on this and once again the Soviets did not entirely share why they sought this change in the design of the docking module. Slowly, American engineers discovered that the Soviets carried no extra gas on board to provide breathable air in the case of a malfunction. These design changes requested by the Soviet Union were in part as a result of their recent failures, although in the early planning progress, Soviet designers were reticent to admit

their failures with their American counterparts. Adding to the difficulty of being open was the American success in addressing launch and flight issues mid-mission, and resolving the issues successfully. American ingenuity was best highlighted in the cases of Apollo 13 and the 1973 Skylab 1 launch.

In the wake of the Soviet disasters, the American space station, Skylab I was launched. Although the Americans faced issues upon launch of Skylab, a follow up docking mission of three astronauts repaired two broken solar panels and installed a new shield to protect the station from meteorites, all of which were damaged while NASA put Skylab into orbit. Skylab 1 was fully operational after the repairs. The astronauts also reclaimed the endurance record in space; they occupied the station for twenty eight days. The disparities in the ability of NASA and of the Soviet Union to repair a damaged craft were an early concern for the U.S. public. Even in Congress, those who hailed the space venture at the beginning began to question the worth of a cooperative mission. Most of the United States was not privy to the details of the failed USSR missions; they simply saw the USSR equipment as unreliable. The cooperative channels established through NASA and the Soviets began to slowly chip away at these fears. As Soviet engineers became more comfortable with their counterparts in NASA, they also seemed to be more willing to share details of their space program. Outside of NASA however, the reluctance of the Soviets to disclose information on these failures, especially regarding the fatalities of cosmonauts to the press, added to the growing public uncertainty of the value of a U.S.-USSR mission.

To those in the public and Congress that were weary of the Soviet disasters, it became more apparent that the Apollo-Soyuz Test Project appeared as an opportunity for the Soviet Union to gain parity after losing out in the race to the Moon. As a result, ASTP was thought to be a technological giveaway of tested American products to aid the struggling Soviet program.

Aviation Week and Space Technology ran articles in back-to-back issues that included details on the Soyuz capsule.[181] The series pointed out the similarities between the Soyuz and Mercury/Gemini capsules, stating that in certain areas the "Soyuz capability is below that in the Mercury spacecraft." *Aviation Week* surmised that some Soviet spacecraft capabilities were at least thirteen years behind the United States.[182] Such portrayals of Soviet technology in the American media dealt a blow to Soviet egos. To compound the situation, NASA officials shared their frustrations in these early working groups with the media, their personal thoughts and feelings of the mission left on record for the Soviet cosmonauts and managers to read. Technical manager for the Apollo Soyuz Test Project, Glynn Lunney, privately chided ASTP officials to refrain from comparing NASA to the Soviet Union's space program in the press. Lunney reminded them of the sensitivity of the Soviet Union to negative comparisons of the Soyuz to the Apollo. Lunney advised that mixing "technical facts that are true" with opinions and telling the press was "not the way to do business."[183]

Despite his pronouncement, Lunney too was concerned with the Soyuz 11 incident. In the wake of the Salyut failures in 1973, Lunney sent a strongly worded letter along with his assistant who accompanied a working group meeting in June of that year. Lunney was forced to push the Russians for an explanation of the incident. Bushuyev responded in kind and in the Houston trip later in September, provided the explanation that Lunney demanded.[184] This episode highlighted two different paths in which collaboration existed. The first was that official Soviet

[181] "Soyuz Give Cosmonauts Little Control," *Aviation Week and Science Technology*, January 21, 1974, 38-42; "Fuel, Sensors Limit Soyuz Maneuvering," *Aviation Week and Science Technology*, January 28, 1974, 36-41.
[182] "Soyuz Give Cosmonauts Little Control," *Aviation Week and Science Technology*, January 21, 1974, 38.
[183] Edward C. Ezell, "Ezell Log Note #5: Notes on Director's Tag-up Meeting," April 17, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 5.
[184] Edward C. Ezell, "Ezell Log Note #27: Conversation with Dave Scott," 10-12; Soviet officials also shared this information on Soviet failures with George Low on a trip to Moscow in October, 1973. See George Low, "Visit to Moscow, October 14-19, 1973," November 1, 1973, in *Exploring the Unknown Volume 2: External Relations*, pg. 199-214.

leadership, those who were responsible to Communist party members, remained in lock step with Soviet information policies. Bushuyev, in this instance, had to request from higher-ups that the material be released to NASA officials. The second, and perhaps more symbolic of the role in which collaboration played, was the fact that Lunney and others had heard a number of different stories regarding the failure of Soyuz 11 from the working group members of the USSR. Soviet technicians opened up to their U.S. counterparts in areas deemed embarrassing or sensitive much earlier than those who reported on behalf of the Communist government.

In December 1971, Ilya Lavrov, who worked in Environmental Control Systems revealed the details of Soyuz 11 to his American counterpart, Robert Smylie. The conversation resulted as an inquiry from Smylie as to why Lavrov had appeared so tired.[185] Smylie took great pride in the fact that the Soviet had opened up to him so freely. Of course, others had asked the Soviets at the working group level as to what happened, and the answers they received varied from vague recollections of the incident to more specific details regarding the tragedy. As a result, Lunney had to get a straight answer from the man who ultimately was responsible for the Soviet team. Bushuyev confirmed the story Smylie was told. Despite the hassle of the Soviet way of doing things for NASA engineers, relationships of the working group teams were more open than those at the managerial level. This was especially the case with the Soviet and American cosmonaut/astronauts.

The American space crew was announced on 30 January 1973. Apollo -Soyuz offered the astronaut corps an opportunity to return to space. After the final Apollo 17 mission, astronauts were reassigned to various departments and jobs in NASA administration. Brigadier General Tom Stafford, a two-time Gemini astronaut and commander of Apollo 15 noted that

[185] Edward C. Ezell, "Ezell Log Note #24: Summary of recorded interview with Robert Smylie," August 15, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 3.

"several unflown astronauts" checked with him to show interest in participating in the joint mission. Stafford noted that these astronauts had ended up in "dead-end jobs" in the Skylab program.[186] Stafford was the chief of the astronaut office, a branch within NASA administration responsible for setting the schedule and deciding flight crews on the Apollo and Skylab missions. Stafford was chosen as commander of the ASTP by Christopher Kraft, who had been promoted Manned Spacecraft Center director following the resignation of Robert Gilruth in January 1972. Following the announcement of ASTP in May 1972, Stafford understood he was a good candidate for the job. He had a large amount of flight experience in rendezvous-the first pilot to do so in Gemini 6, but was also well acquainted with the Russians. In June 1971 while in Europe, Stafford was contacted by Nixon to represent the American astronauts and served as a pallbearer at the state funeral of the Soyuz 11 crew.[187] He entered Kraft's office and informed of him of his interest in the mission, specifically in the commander position. Stafford was not the only astronaut interested in contention for the commander position.

Deke Slayton was the other astronaut interested in commanding ASTP. Slayton began his career at NASA as one of the original Mercury 7, America's first group of astronauts. Slayton was the only one of the seven to not see flight time. Early in the training process, doctors noticed an irregular heartbeat in Slayton; they ran and re-ran tests, the problem only surfaced once in a while. Doctors were confounded and gathered assistance from heart specialists around the country, none of whom knew how to explain the issue. Nevertheless, Slayton was cleared for flight because the condition did not affect his performance in any of the rigorous tests. Shortly after John Glenn's orbital flight however, science advisor to Kennedy, Jerome Wiesner, told NASA administrator Jim Webb to ground Slayton. Wiesner's reasoning was sound: if there

[186] Thomas P. Stafford with Michael Cassutt, *We Have Capture* (Washington, D.C.: Smithsonian Institute Press, 2002), 163.
[187] Stafford, 154-155,

happened to be an incident and the public knew that NASA let Slayton fly, it could spell the end for the space program.[188] Slayton became a liability to the program. Rather than removing him from the program, NASA officials placed Slayton in a new role: Coordinator of Astronaut Activities. Later he became Director of Flight Crew Operations, and was responsible for coordinating the activities and schedules of the astronaut corps.

Slayton's flight reinstatement came in 1972. Unfortunately for Slayton, the final Apollo crews and the upcoming Skylab crews were decided. When the word came that ASTP was agreed upon, Slayton appointed himself for flight and resigned his position. Slayton originally requested he be placed commander, but Kraft denied his request. Tom Stafford was more capable as commander given his flight experience and favorable relationship with their Russian counterparts. With Slayton and Stafford on board, the final slot was offered to Vance Brand. Brand was one of the astronauts who approached Stafford and requested the spot. Both Stafford and Slayton, later recollected, that they recommended Brand to complete the crew. Brand had served backup on two Apollo crews and the Skylab missions as well. Despite his lack of flight experience, both Stafford and Slayton noted his work as back-up was stellar, and he deserved a shot at flight.[189]

The announcement of the American crew put pressure on the Soviet Union to do the same. Five months after the American crew was announced, the Soviets released that Alexei Leonov, the first human to make an EVA and Valeri Kubasov, veteran of Soyuz 6 made up the Soviet team. Leonov and Kubasov had a harrowing past of their own. They were the main crew for Soyuz 11, but fell ill shortly before the launch. The Soyuz 11 backup crew flew instead, who carried out the first visit to Salyut 1 and tragically died on their return to Earth. After the Soyuz

[188] Alan Shepard et al., *Moon Shot* (Atlanta: Turner Publishing, 1994) 73-74, 152-153.
[189] Shepard, 163.

disaster, Leonov and Kubasov were first in line to fly Soyuz 12, which was cancelled because of 11, as well as the Salyut 2 and Salyut 3 space station missions, both of which ended abruptly when the stations failed to be placed into stable orbit.[190]

The American and Soviet teams traded visits to each other's facilities beginning in Houston in July 1973. Over the course of the next two years, USSR and U.S. crews met six times, alternating each time between the Soviet Union and Houston. It was during these crew trips where a comradery was built between the cosmonauts and astronauts. Kept out of NASA's official ASTP history, Tom Stafford and Deke Slayton expanded upon these visits in their memoirs and regaled about aspects of the trips after the day's work was completed. Astronauts and cosmonauts dined with one another, drank with one another, spent time with the other's families and connected on a personal level. The language barrier was also slowly broken. Although the cosmonauts teased Commander Stafford about his southern drawl and pronunciation of Russian words, the Americans shot right back when training for flight the Russian delegation confused the words "maneuver" with "manure."[191] Like the relationship that Robert Smylie shared with his Soviet counterpart, Stafford and company built relationships that transcended politics. More importantly, it provided additional outlets to release Soviet secrets. Because of this relationship, Stafford was able to get the cosmonauts to release information that threatened the flight of ASTP.

The Soviets ran a bevy of flights between 1972 and 1975. In part, this was due to the lack of flights and disasters that plagued the space program since the late 1960's. The other reason for the flights were to test new Soyuz variations, some intended for manning a space station and others intended for the Apollo-Soyuz launch. Soyuz 12 and 13 marked a return of the

[190] Siddiqi, 815.
[191] Stafford, 172-175.

Soviet to space but two subsequent missions, Soyuz 14 and Soyuz 15, drew concern and criticism from the western press. An article in *The Economist* wrote a scathing piece and accused the Soviets of betrayal during the goodwill mission. Though the Soviet government did not acknowledge it at the time, Soyuz 14 was a military mission in which cosmonauts docked with the Salyut 3 space station. What tipped NASA officials off was that Soviet ground control used coded messages and a different communication channel to speak with the cosmonauts. Usually, the ground control communications were clear and encoded. The west speculated that the cosmonauts were setting Salyut 3 up to be a manned orbital reconnaissance vehicle. Soviets denied the military applications of the flight and reported it was in preparation for ASTP, but the flight and crew had no resemblance to the upcoming mission.[192]

The secrecy continued with the follow-up mission, Soyuz 15. A malfunction prevented Soyuz 15 from docking with the Salyut was subsequently deorbited shortly after. Soyuz 15 mission characteristics were similar to that of Soyuz 14, and once again the press and public demanded an answer. To make matters worse, the failure to dock gave an impression that the Soyuz capsule may not be ready for flight. At first, NASA seemed reticent to tap the Soviets for answers. Glynn Lunney defended the Soviet program at first, telling a reporter: "Look, we flew Skylab, and we flew spacecraft, and had problems with spacecraft, and it did not enter my mind to pick up the phone and explain all those problems to my counterpart within 24 hours."[193] But as the press barrage continued, NASA officials were unsure why the Soviets flew a mission around, rather than docking to, a space station that was proved to be functioning. Stafford and other NASA senior officials, including Administrator George Low, became increasingly concerned at the potential of a Congressional intervention regarding the Soviet space program. No answer

[192] Michael Getler, "Soviets Seen Testing Spy Spacecraft," *Washington Post*, July 25, 1974, A1, A18.
[193] Edward C. Ezell, "Ezell Log Note #30: Interview (taped) with Glynn S. Lunney," October 9, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 6.

from the Soviet side was adequately given. Two weeks after the flight, Stafford met with Vladimir Shatalov, who was responsible for cosmonaut training, who had arrived in the United States with the ASTP cosmonauts for training. Stafford pressed Shatalov and told him it could put the mission in jeopardy if the Soviet Union was not forthcoming about the role of Soyuz 15 and if its flight had to do with the upcoming ASTP. Shatalov agreed to contact the senior officials in Moscow. Two days later, Bushuyev made an announcement detailing the events of Soyuz 15 and that it did not affect the joint project. The Soviet announcement prevented American backlash.[194]

Cooperation in the Apollo-Soyuz Test Project was not necessarily a technical marvel or complete collaboration between the Cold War superpowers. The docking mechanism developed for the mission was somewhat superficial in that it was built specific to the Apollo and Soyuz spacecrafts. Soyuz continues to be used by the Russian space program in the present day, albeit with significant modifications, but Apollo did not fly after the joint mission. The docking mechanism applied specifically to those vehicles only. NASA reasoned that: "the basic concepts and requirements developed for ASTP will be applicable to future systems." Even if the hardware could not be re-used, NASA argued, the process of a future joint docking mission would inherently be the same.[195] Apollo-Soyuz was a "dry run" of international compatibility in space.

Scientific experiments were performed on board during the joint flight largely to help bolster the reason for ASTP.[196] That is, as initial favor for Apollo-Soyuz in the media and in

[194] Stafford, 177-178.
[195] "Apollo-Soyuz Test Project Initial Mission Report," Box 31, Folder 25/1A. NASA Johnson Space Center. ASTP Correspondence 1975 Mission Planning, Program Management. John Burgess Facility, National Archives at Fort Worth, Fort Worth, TX, 24.
[196] Yuri Karash, *Superpower Odyssey* (Reston, Virginia: American Institute of Aeronautics and Astronautics, 199),117.

Congress turned to disfavor, NASA officials added scientific experiments to the flight to boost the merit of the joint venture. The experiment package decided by NASA included five joint U.S.-USSR experiments and a number of U.S.-only experiments to be flown by the Apollo crew over the course of three days after undocking with the Soviet Union. The experiments were valuable in their own right and added to the growing list of space sciences performed on the Apollo and Skylab flights, but could not have stood apart from the political implications of ASTP to justify a launch.[197]

ASTP proved to be significant as a product of détente. While the foreign policy was in place for only a short number of years, it made in-roads at relieving Cold War tension between the two superpowers. Just as in détente, cooperation did not completely demolish competition between the US and USSR but only suspended it temporarily in the hopes that some greater peace could be achieved between the superpowers in the future. The cost of cooperation came at the expense of the United States giving up its Cold Warrior position relative to the USSR. By promising to limit arms, an objective long requested by the Soviet Union, the United States temporarily abandoned a twenty five year foreign policy position, while the Soviet Union largely maintained its secrecy concerning its space program.

To concede to USSR demands of partial disarmament was not an option for the U.S. until they re-established technological superiority, i.e., landed on the Moon. Apollo 11 was a comfort to the American public that the United States regained the pre-eminent position in a world determined by efficacy in science and technology. As former Administrator Thomas O. Paine said: "a strong demonstration of American technical and military capability is the best assurance (we have) for maintaining peace."[198] The U.S. had been trumped by the Soviet Union in the field

[197] See Ezell, *The Partnership*, Appendix E lists the various experiments and results.
[198] Thomas O. Paine, interviewed by Robert Sherrod, September 10, 1970, 26.

of science and technology between 1957 and 1965, as evidenced by Cuban Missile Crisis, the Vietnam War, and Soviet space efforts, all of which lent an air of credibility to Soviet technological claims. American successes and Soviet failures evidenced through space milestones made SALT possible. It was easier for the Soviet Union to accept cooperation in a technologically inferior position because they simply had more to gain.

The interactions between the personnel of the U.S. and USSR also helped to bridge political gaps. Arnold Frutkin later commented that the mission "humanized" the individual Soviet, and put into context that person's relation to his government.[199] Commander Tom Stafford reaffirmed Frutkin's observation: "I had stopped seeing them as faceless enemies, but no recognized them as complicated human beings trying to make the best of a terrible and complicated political system."[200] Living and working between NASA and personnel from the USSR exemplified that people were in affect the same. NASA distributed a request for a post-mission report in which personnel recounted their experiences. At the NASA level, personnel hoped that their example would influence the Soviet space program in positive ways.

In the early years of planning, the bureaucracy of the Soviet government and the traditional way of doing things typically slowed down progress. By the end of the joint mission, personnel at NASA saw noticeable change in some of their counterparts. The way junior and senior Soviets interacted became more of a working relationship rather than the junior taking the subordinate role.[201] Junior NASA personnel also hoped that this experience set the stage for unilateral and bilateral cooperation down the road. Other NASA engineers in a number of instances looked fondly upon the mission as a hope to pursue further international activities. The fact alone that the Cold War rivals worked together was significant in itself. One remarked: before (ASTP) the

[199] Arnold Frutkin, interviewed by Rebecca Wright, January 10, 2002, 54.
[200] Stafford, xi.
[201] W.W. Guy and James R. Jaax, interviewed by Edward C. Ezell, January 19, 1976, 4.

U.S. and Soviet Union "approached each other with a sword in one hand," the two day joint flight of ASTP "eclipsed" political rhetoric for the "tremendous importance of another order- Man working for Man for the benefit of Mankind."[202] Despite the poetic proclamation of the engineer, competition was the only true element "eclipsed" by the cooperation of ASTP. The eclipse soon ended.

[202] "Trip Report, Apollo/Soyuz Mission," Box 32, Folder 25/1A. NASA Johnson Space Center. ASTP Correspondence 1975, Program Management, Reliability. John Burgess Facility, National Archives at Fort Worth, Fort Worth, TX, 1-2.

EPILOGUE

BREAKDOWN AND REBIRTH OF COOPERATION

Achieving collaboration between the United States and the USSR in space was a long road, unfortunately shortly after Apollo-Soyuz that road hit a dead end. Outreaches by the United States to the Soviet Union began with Eisenhower and finally culminated in the administration of Gerald Ford. Early cooperative attempts were routinely dismissed by the Soviet Union, usually on the basis of nuclear disarmament. The attempts that were successful were limited in its utility. The agreement between Blagonravov and Dryden in 1962 offered an opportunity at cooperation early in the space race. But after the agreement, the Soviet Union responded erratically to the information exchange as mandated. Administrator James Webb characterized the nature of U.S.-Soviet cooperation in space in a memo to President Lyndon Johnson in January 1964 regarding : "Progress [in cooperative negotiations] has almost invariably required U.S. initiative…" he advised the president, "At this time it seems likely that Soviet performance will continue [to be] ragged, with little regard for deadlines."[203]

For much of the Space Race, this was typical of attempts at cooperation with the Soviet Union. When Richard Nixon entered office in 1969 the goal of cooperation with the Soviet Union in space finally became a reality. Aided by the success of the Apollo Moon landings and a string of Soviet failures, cooperation between the United States and Soviet Union offered the latter a chance to show parity with the leaders in space. In the United States, the Apollo-Soyuz Test Project started more as a foreign policy program rather than a space program. The political motivation for ASTP was blatant, but it was not unlike the projects of NASA under Eisenhower,

[203] James Webb, "U.S.-USSR Cooperation in Space Research Programs," January 31, 1964 in *Exploring the Unknown Volume 1: Organizing for Exploration*, 178-181.

Kennedy, and Johnson, that is, an extension of presidential policy. While their predecessors stressed cooperation, Nixon and Ford, succeeded in getting the Soviets to cooperate on a joint mission. It is somewhat unusual that although the Apollo-Soyuz Test Project did more to build political bridges rather than technical ones, the two countries failed to follow the ASTP up with additional missions of cooperation.

A number of factors played into the lack of cooperation after ASTP. First, despite the mandate for cooperation, the Soviet Union was still not entirely open with the United States. ASTP did well to get the two groups working together but Soviet secrecy still lingered in the background of ASTP planning. Even the organization of the USSR space program was withheld from the Americans; the Soviet Academy of Sciences acted as the front organization for USSR space activities. Nor did cooperation with the United States help quell military or defense insecurities that the Soviet Union carried over from the 1960's. The Shuttle decision of the United States stoked fears among the USSR bureaucrats that the Shuttle was capable of launching a military strike. Though the Shuttle secretly carried reconnaissance satellites into space, its intentions were never to be used as a military vehicle. Cold War fear pervaded however, when Brezhnev got word that Shuttle could carry a military payload and drop it on strategic USSR centers. He allegedly immediately approved a program to compete with the new U.S. Shuttle.[204] The Soviet *Buran* became the focus of the Soviet space program in the 1970's.[205] Buran became a logistical and economic nightmare for the Soviet Union. Unlike the satellite and manned spacecraft race of the 1950's and 1960's, few knew of the existence of Buran outside of the

[204] The origins of the decision to build Buran continue to be shrouded in secrecy. Asif Siddiqi shares a story that he relates to "a folk tale," in it Leonid Smirnov reported to Brezhnev that the Americans were "intensively working on a winged space vehicle." After a moment's contemplation, Brezhnev responds: "We are not country bumpkins here. Let us make an effort and find the money." Siddiqi, 835.
[205] Siddiqi, 835-836.

Soviet Union. The intention for competition in space was present, but economic and political turmoil ensured the cancellation of the Buran program in 1993.[206]

Cooperation in space also became the victim of U.S. presidential policy. In 1969, Thomas O. Paine envisioned a new direction of space policy, but ultimately realized that vision was constrained by presidential decision making and Congress' approval of NASA's budget. These two checks on NASA's programs relegated the hopes of Paine for NASA to become an independent scientific organization rather than an executive and legislative foreign policy tool. On the foreign policy side, the collapse of détente and renewed interest in competition during the Carter presidency proved that the United States and Soviet Union was unable to come to terms with "peaceful co-existence."[207] While the 1972 agreement between Nixon and Kosygin provided for continued cooperative talks between NASA and Soviet space officials and the agreement was renewed in 1977, several negotiations broke down in other foreign policy areas including nuclear arms, SALT II, and the Israel/Palestinian feud. The resumption of weapons testing and a conflict in the Middle East that culminated in the 1979-1980 Afghan War broke any chance for cooperation between the U.S. and USSR.

Domestically, diplomat Robin Edmonds also credits the Watergate scandal for removing public support from détente. Kissinger continued to occupy the White House after Nixon's resignation in 1974, and because détente was so closely linked to the untrusted ex-president, even its mere mention in the later presidential campaign drew public support away from Ford.[208] Under a new president, Jimmy Carter, NASA programs were set on cruise control. The administration did not completely abandon cooperation with the Soviets, but did not pursue new programs based upon the post-ASTP talks. Carter also ensured that the concessions made in the

[206] Ibid. 841.
[207] LaFeber, 253.
[208] Edmonds, *Soviet Foreign Policy: The Brezhnev Years*, 143.

Nixon era would not be the basis for cooperation. Domestic financial woes also had an effect on space policy: the rising unemployment and inflation rates experienced in the Carter presidency were reasons for tightening the budget on NASA. Coupled with the completion of the Shuttle project, the Carter administration directed NASA to work with what it had, rather than chart any long term visible space goals on the level of Apollo.[209]

Cost/benefit analysis also restricted prospective post-ASTP joint activities. At one point in 1974, Arnold Frutkin advised George Low that cooperation should be sought with European nations in the building of an international space station, a project imagined after the completion of Shuttle. While he noted that the USSR was a potential partner, Frutkin worried about the international implications of neglecting the European countries, especially since they were "operationally, technically, financially, and politically" better suited to be senior partners.[210] The Soviets on the other hand thought a follow-up mission for Apollo to dock with Salyut unreasonable because reciprocation was not possible. With the Skylab missions over, there was no opportunity for a Soviet craft to visit an American space station.[211] Len Nicholson also discounted the idea of a follow up ASTP mission, since the highlight of ASTP was the first international docking and joint experimentation of two spacecraft, there was little to build upon in a subsequent mission.[212]

Under the administration of President Ronald Reagan the subject of cooperation with the Soviets in space came up once again. At first, Reagan let the ten year agreement on Soviet-

[209] U.S. National Security Council, "NSC 42: Civil and Further National Space Policy," October 10 1978 <http://www.jimmycarterlibrary.gov/documents/pddirectives/pd42.pdf> (accessed July 1, 2015,) 2.
[210] Arnold Frutkin, "International Space Station Approach," June 7, 1974, in *Exploring the Unknown Volume 2: External Relationships*, 87.
[211] Karash, 131.
[212] Edward C. Ezell, "Ezell Log Note #29: Taped Interview this date with L.S. Nicholson," October 4, 1974, Ezell's ASTP Log Notes, Folder 1, Johnson Space Center, Historical Reference Collection, Houston, TX, 2-3.

American cooperation set in 1972 expire as a result of Soviet policies in Poland.[213] Three years later however, in recognition of the tenth anniversary of Apollo-Soyuz, Reagan attempted to use the commemoration to renew interest in a joint space mission. Between July 1984 and March 1985, Reagan made overtures on a number of new prospective joint missions, including a Martian landing.[214] Those inside NASA and some members of the Congress let it be known that they too supported a cooperative mission. Congress' reasoning that it would lessen the burden of NASA programs on the tax payers, and also provide an alternative to a renewed arms race.[215] While relations between the U.S. and USSR improved as a result of the Gorbachev reforms, such a mission failed to materialize.

Finally cooperative ventures were renewed in 1994. The need for competition ended with the collapse of the Soviet Union. The end of the Cold War resulted with America being the ideological victor. America was able to retain its identity as a global superpower as the Soviet Union crumbled. Political ideology and secrecy rooted in Cold War competition prevented American and Russians from working together in space with the exception of one little eclipse of competition. The American resolve against nuclear disarmament hampered U.S.-USSR negotiations beginning with Eisenhower. The Nixon-Brezhnev agreement that temporarily slowed competition under détente offered a brief respite but did not solve any long standing feud between the U.S. and USSR. It was not until the Soviet policies of Perestroika and Glasnost enacted by Mikhail Gorbachev that led to the increased openness of the Soviet Union. The secrecy that helped fueled Cold War paranoia was eliminated. Under the Clinton administration in 1994, American astronauts met with their Russian counterparts aboard space station Mir. As a part of a four year plan, American astronauts lived and worked alongside cosmonauts in order to

[213] Karash, 134.
[214] Craig Covault, "Reagan Renews Plan for Joint Space Mission with Soviets," *Aviation Week and Space Technology*, July 15, 1985, 16-17.
[215] Karash, 135-139.

learn how to perform extended stay tasks in a space station. Since, Russian and American astronauts have maintained close cooperative ties as a result of the International Space Station. With the cancellation of the Shuttle program in 2011, Russia has provided manned flights for American astronauts to inhabit the International Space Station. For the moment, cooperation in space is a mainstay, but recent actions taken by Russia in the Crimea may threaten a twenty year peaceful coexistence.

REFERENCES

Primary Sources

Agnew, Spiro, chairman. *The Post-Apollo Space Program: Directions for the Future*. Space Task Group. September 1969.

Aviation Week and Space TechnologyThe Daily Herald (U.K.)Eisenhower, Dwight D. "Eisenhower Farewell Address (Full)," YouTube video, January 17, 1961. https://www.youtube.com/watch?v=CWiIYW_fBfY.

Kennedy, John F. "JFK Library Releases Recording of President Kennedy Discussing Race to the Moon." John F. Kennedy Presidential Library and Museum . http://www.jfklibrary.org/About-Us/News-and-Press/Press-Releases/JFK-Library-Releases-Recording-of--President-Kennedy-Discussing-Race-to-the-Moon.aspx.

----- "Moon Speech," Rice Stadium. September 12, 1962.

----- "Special Message to the Congress on Urgent National Needs." May 25, 1961. Online by Gerhard Peters and John T. Woolley, *The American Presidency Project*. http://www.presidency.ucsb.edu/ws/?pid=8151.

Kennedy, John F. and Richard M. Nixon. "Presidential Candidates Debate: October 7,1960." *C-SPAN* video. October 7,1960. http://www.c-span.org/video/?33149-1/presidential-candidates-debate.

Johnson Space Center. Johnson Space Center History Collection. ASTP series.

Logsdon, John M., ed. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Vol. 1: Organizing for Exploration. Washington D.C.: National Aeronautics and Space Administration, 1995.

-----. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Vol. II: External Relationships. Washington D.C.: National Aeronautics and Space Administration, 1996.

-----. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program*, Vol. VII: Human Spaceflight: Projects Mercury, Gemini, and Apollo. Washington D.C.: National Aeronautics and Space Administration, 2008.

McMahon, Robert J. et al., eds. *Foreign Relations of the United States, 1955-1975*. Vol. XI: United Nations and General International Matters. Washington, D.C.: U.S. Government Printing Office, 1988.

National Aeronautics and Space Administration, *Aeronautics and Astronautics 1970*. Washington, D.C.: NASA, 1972.

National Archives and Records Administration. Fort Worth, TX. RG 255

New York Times

Nixon, Richard M. *Public Papers of the Presidents of the United States: Richard Nixon 1970*. Washington, D.C.: U.S. Government Printing Office, 1971.

Outlook for Space Study Group. *Outlook for Space: Report to the NASA Administrator*. Washington, D.C.: NASA Technical Information Office, 1976.

Technological Capabilities Panel of the Science Advisory Committee, *Meeting the Threat of Surprise Attack*. Washington D.C., February 14, 1955. https://history.state.gov/historicaldocuments/frus1955-57v19/d9.

Townes, Charles, chairman. *Report of the Task Force on Space*. January 8, 1969.

U.S. Congress. House. *Transfer of Von Braun Team to NASA*. H.R. 567. 86th Cong., 2d sess. February 26, 1960.

U.S. Congress. Office of Technology Assessment. *U.S.-Russian Cooperation in Space*. Washington, D.C.: U.S. Government Printing Office, April 1995.

U.S. Congress. Senate. Committee on Armed Services. Preparedness Investigating Subcommittee. *Inquiry into Satellite and Missile Programs: Hearings Before the Preparedness Investigating Subcommittee of the Committee on Armed Services*. 85th Cong., 1st sess., December 1957.

Washington Post and Times Herald

Secondary Sources

Beschloss, Michael R. *Mayday: Eisenhower, Khrushchev, and the U-2 Affair*. New York: Harper & Row, 1986.

Bloomfield, Lincoln P. "Outer Space and International Cooperation." *International Organization* 19, no. 3 (Summer 1965): 603-621.

Bogle, Lori Lyn, ed. *National Security Policy Planning from Truman to Reagan and from Stalin to Gorbachev*, vol. 2 of *The Cold War*. New York: Routledge, 2001.

Brooks, Courtney G., James M. Grimwood, and Loyd S. Swenson Jr. *Chariots for Apollo: A History of Manned Lunar Spacecraft*. Washington, D.C.: National Aeronautics and Space Administration, 1979.

Brugioni, Dino. *Eyes in the Sky: Eisenhower, the CIA, and Cold War Aerial Espionage*. New York: Naval Institute Press, 2010.

Brzezinki, Matthew. *Red Moon Rising*. New York: Times Books, 2007.

Chertok, Boris. *Rockets and People*. Vol. 1. Washington D.C.: National Aeronautics and Space Administration, 2005.

-----. *Rockets and People*. Vol. 2. Washington D.C.: National Aeronautics and Space Administration, 2006.

Cutler, Michael, ed. *International Cooperation in Space Operations and Exploration*. AAS Science and Technology Series 27. Tarzana, California: AAS Publications Office, 1971.

Daniloff, Nicholas. *The Kremlin and the Cosmos*. New York: Alfred A. Knopf, 1972.

Day, Dwayne A. "Tinker, Tailor, Satellite, Spy." The Space Review. http://www.thespacereview.com/article/989/1%20accessed%201/22/2015.

Day, Dwayne A., John M. Logsdon, and Brian Latell. *Eye in the Sky*. Washington, D.C.: Smithsonian Institute Press, 1998.

Dembling, Paul G. "National Aeronautics and Space Act of 1958: Revisited." *Journal of Space Law* 34, no. 2 (January 2008): 203-220.

Dockrill, Saki and Günter Bischof, eds. *Cold War Respite: The Geneva Summit of 1955*. Baton Rouge: Louisiana State University Press, 2000.

Donnelly, John. P. "Apollo-Soyuz: Duel in the Sky." *Public Relations Review* 3, no. 1 (January 1977): 19-32.

Dunay, Pál, Márton Krasznai, Hartwig Spitzer, Rafael Wiemker, and William Wyne. *Open Skies: A Cooperative Approach to Military Transparency and Confidence Building*. Geneva, Switzerland: United Nations Publications, 2004.

Durant III, Frederick C., ed. *Between Sputnik and the Shuttle: New Perspectives on American Astronautics*. San Diego, California: American Astronautical Society, 1981.

Durch, William J. ed. *National Interests and the Military Use of Space*. Cambridge, Massachusettes: Ballinger Publishing Company, 1984.

Edmonds, Robin. *Soviet Foreign Policy: The Brezhnev Years*. New York: Oxford University Press, 1983.

Ezell, Edward C. *The Partnership: A NASA History of the Apollo-Soyuz Test Project*. 1978. Reprint, Mineola, New York: Dover Publications, 2010.

Froelich, Walter. *Apollo-Soyuz*. Washington, D.C.: Government Printing Office, 1976.

Frutkin, Arnold. *International Cooperation in Space*. Englewood Cliffs, New Jersey: Prentice-Hall, 1965.

Gaddis, John Lewis. *We Now Know: Rethinking Cold War History*. New York: Oxford University Press, 1997.

Glennan, T. Keith. *The Birth of NASA: The Diary of T. Keith Glennan*. Washington, D.C.: National Aeronautics and Space Administration, 1993.

Gotlieb, A.E. and C. M. Dalfen, "International Relations and Outer Space: The Politics of Cooperation" *International Journal* 25, no. 4 (Autumn 1970): 685-703.

Green, Constance McLaughlin and Milton Lomask. *Vanguard: A History*. Washington, D.C.: National Aeronautics and Space Administration, 1970.

Haanappel, Peter P.C. *The Law and Policy of Airspace and Outer Space: A Comparative Approach*. The Hague, Netherlands: Kluwer Law International, 2003.

Hacker, Barton C. and James M. Grimwood. *On the Shoulders of Titans: A History of Project Gemini*. Washington, D.C.: National Aeronautics and Space Administration, 1977.

Hall, Rex D., David J. Shayler, and Bert Vis. *Russia's Cosmonauts: Inside the Yuri Gagarin Training Center*. Chichester, U.K.: Praxis Publishing, 2005.

Harford, James. *Korolev How One Man Masterminded the Soviet Drive to Beat America to the Moon*. New York: John Wiley & Sons, 1997.

Harvey, Dodd L. and Linda C. Ciccoritti. *U.S.-Soviet Cooperation in Space*. Miami: University of Miami Press, 1974.

Heppenheimer, T.A. *The Space Shuttle Decision: NASA's Search for a Reusable Space Vehicle*. Washington, D.C.: National Aeronautics and Space Administration, 1999.

Hixson, Walter L. *Parting the Curtain: Propaganda, Culture, and the Cold War, 1945-1961*. New York: St. Martin's Press, 1997.

Humble, Ronald D. *The Soviet Space Program*. New York: Routledge, 1988.

Ishlinskiy, Yu. ed., *Akademik S.P. Korolev: ucheniy, inzhener, chelovek*. Moscow: Nauka, 1986. Quoted in Asif Siddiqi, *Challenge to Apollo: The Soviet Union and the Space Race, 1945-1975*. Washington, D.C.: National Aeronautics and Space Administration, 2000.

Jamgotch, Nish Jr., ed. *Sectors of Mutual Benefit in U.S.-Soviet Relations*. Durham, North Carolina: Duke University Press, 1985.

Jervis, Robert and Seweryn Bialer, eds. *Soviet-American Relations After the Cold War*. Durham, North Carolina: Duke University Press, 1991.

Johnson-Freese, Joan. *Space as a Strategic Asset*. New York: Columbia University Press, 2007.

Johnson, Nicholas L. *Soviet Military Strategy in Space*. London: Jane's Publishing: 1987.

Jones, Greta. *Science, Politics, and the Cold War*. London: Routledge, 1988.

Kalic, Sean N. *U.S. Presidents and the Militarization of Space, 1946-1967*. College Station, Texas: Texas A&M University Press, 2012.

Kash, Don E. *The Politics of Space Cooperation*. West Lafayette, Indiana: Purdue University Press, 1967.

Keatley, Anne G., ed. *Technological Frontiers and Foreign Relations*. Washington D.C.: National Academy Press, 1985.

Killian Jr., James R. *Sputnik, Scientists, and Eisenhower*. Cambridge: MIT Press, 1977.

Kissinger, Henry. *White House Years*. Boston: Little, Brown, and Company, 1979.

Kuehn, Thomas J. and Alan L. Porter, eds., *Science, Technology, and National Policy*. Ithaca, New York: Cornell University Press, 1981.

LaFeber, Walter. *America, Russia, and the Cold War, 1945-1990*, 6th ed. New York: McGraw-Hill, 1991.

Lambright, W. Henry, *Presidential Management of Science and Technology: The Johnson Presidency*. Austin: University of Texas Press, 1985.

Launius, Roger. "Eisenhower, Sputnik and the Creation of NASA." *Prologue* 28 (Summer 1996): 127-143.

-----. *NASA: A History of the U.S. Civil Space Program*. Malabar, Florida: Krieger Publishing Company, 1994.

-----, John M. Logsdon and Robert W. Smith, eds. *Reconsidering Sputnik: Forty Years Since the Soviet Satellite*. Amsterdam: Harwood, 2000.

----- and Howard E. McCurdy, eds. *Spaceflight and the Myth of Presidential Leadership*. Urbana: University of Illinois Press, 1997.

Logsdon, John M. *John F. Kennedy and the Race to the Moon*. New York: Palgrave Macmillan, 2010.

Lovell, Bernard. "The Great Competition in Space." *Foreign Affairs* 51, no. 1 (October, 1972): 124-138.

-----. *The Origins and International Economics of Space Exploration*. New York: John Wiley & Sons, 1973.

McCurdy, Howard E. *Inside NASA: High Technology and Organizational Change in the U.S. Space Program*. Baltimore: Johns Hopkins University Press, 1993.

McDougall, Walter. *…The Heavens and the Earth*. New York: Basic Books, 1985.

Newell, Homer. *Beyond the Atmosphere: Early Years of Space Science*. Washington, D.C.: National Aeronautics and Space Administration, 1980.

Oberg, James E. *The New Race for Space: The U.S. and Russia Leap to the Challenge for Unlimited Rewards*. Harrisburg, Pennsylvania: Stackpole Books, 1984.

-----. *Red Star in Orbit*. New York: Random House, 1981.

Pedlow, Gregory W. and Donald E. Welzenbach. *The CIA and the U2 Program*. Washington, D.C.: Central Intelligence Agency, 1998.

Peebles, Curtis. *The Corona* Project. Annapolis, Maryland: Naval Institute Press, 1997.

Reynold, David. *Summits*. New York: Basic Books, 2007.

Shelton, William. *Soviet Space Exploration: The First Decade*. New York: Washington Square Press, 1968.

Shepard, Alan, Deke Slayton, with Jay Barbree and Howard Benedict. *Moon Shot*. Atlanta: Turner Publishing, 1994.

Siddiqi, Asif. *Challenge to Apollo: The Soviet Union and the Space Race, 1945-1974*. Washington D.C.: National Aeronautics and Space Administration, 2000.

Smith, Hendrick. *The Russians*. New York: Quadrangle, 1976.

Smolders, Peter L. *Soviets in Space*. New York: Taplinger Publishing, 1971.

Stafford, Thomas P. with Michael Cassutt. *We Have Capture*. Washington, D.C.: Smithsonian Institute Press, 2002.

Suri, Jeremi. *Power and Protest*. Cambridge, Massachusetts: Harvard University Press, 2003.

Swenson Jr., Loyd S., James M. Grimwood, and Charles G. Alexander. *This New Ocean: A History of Project Mercury*. 1966. Reprint. Washington D.C.: National Aeronautics and Space Administration, 1998.

Taubman, William. *Khrushchev: The Man and His Era*. New York: W.W. Norton & Co., 2003.

Temple III, L. Parker. *Shades of Grey: National Security and the Evolution of Space Reconnaissance*. Reston, Virginia: American Institute of Aeronautics and Astronautics, 2005.

Tribbe, Matthew D. *No Requiem for the Space Age*. New York: Oxford University Press, 2014.

Wang, Zuoyue. *In Sputnik's Shadow*. New Brunswick, New Jersey: Rutgers University Press, 2008.

Wolter, Detlev. *Common Security in Outer Space and International Law.* United Nations Publication: Geneva, Switzerland, 2006.

Yenne, Bill. *Area 51-Black Jets: A History of the Aircraft Developed at Groom Lake, America's Secret Aviation Base*. Minneapolis, MN: Zenith Press, 2014.