Abstract. While international relations theory has examined the influence of domestic politics upon foreign policy-making, the opposite relationship has not been closely examined. This study argues that domestic policy actors use foreign policy concepts and images to promote and defend domestic policies. In the United States civil space program, foreign policy has traditionally been an important justification for projects and budgets. Foreign policy rationales have included references to specific policy concerns and general appeals to the national interest. These rationales are central to the promotion of the space program, especially the human space flight program. These issues are explored using the Space Station Project (SSP), a controversial program the United States has pursued with fifteen other countries, including Russia. Begun in 1984, the SSP has evolved radically from its original Cold War justifications to become a symbol of post-Cold War cooperation. In this study, the political rationales of the SSP are identified and examined to discover how foreign policy is used to support a predominantly domestic program. Foreign policy ideas and concepts enter into the domestic policy-making process as a means to elevate the perceived importance of a policy. Identification with national security and economic competitiveness gave a higher political value to the SSP and helped it to survive numerous political challenges. This study offers a new framework to examine the interaction between different policy fields that allows for a deeper understanding of national decision-making.

POWER AND DESTINY:

THE INTERNATIONAL SPACE STATION AND U.S. FOREIGN POLICY

Bridging Two Policy Worlds

by

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DISSERTATION

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LIST OF ABBREVIATIONS

ACRV: Assured Crew Return Vehicle
AIAA: American Institute of Aeronautics and Astronautics
ASI: Italian Space Agency (Italian abbreviation)
AWST: Aviation Week and Space Technology
CERN: European Organization for Nuclear Research (French abbreviation)
CIA: Central Intelligence Agency
CSA: Canadian Space Agency
DoD: Department of Defense
ELDO: European Launch Development Organization
ELV: Expendible Launch Vehicle
ESA: European Space Agency
ESRO: European Space Research Organization
EVA: Extra-Vehicular Activity
FGB: Functional Cargo Block (Russian abbreviation)
G-7: Group of Seven Summit Countries
GAO: General Accounting Office
GATT: General Agreement on Trade and Traiffs
GOJ: Government of Japan
HST: Hubble Space Telescope
IGA: Inter-Governmental Agreement
IGY: International Geophysical Year
INPE: National Institute For Space Research, Brazil (Portuguese abbreviation)
IR: International Relations
ISPM: International Solar Polar Mission
ISS: International Space Station
JEM: Japanese Experimental Module
JSC: Johnson Space Center
MOSST: Ministry of State For Science and Technology, Canada
MOU: Memorandum of Understanding
MTCR: Missile Technology Control Regime
NACA: National Advisory Council on Aeronautics
NASA: National Aeronautics and Space Administration
NASDA: National Space Development Agency, Japan
NDEA: National Defense Education Act
NGO: Non-Governmental Organization
NSC: National Security Council
OMB: Office of Mangement and Budget
OMV: Orbital Maneuvering Vehicle
OTV: Orbital Transfer Vehicle
RMS: Remote Maintenance System
RSA: Russian Space Agency
S&T: Science and Technology

SCSC: Superconducting Supercollider
SDI: Strategic Defense Initiative
SEI: Space Exploration Initiative
SIG (SPACE): Senior Inter-Agency Group For Space
SSP: Space Station Project
STS: Space Transportation System (Space Shuttle)
WTO: World Trade Organization

PREFACE

...why sleep ye, travellers, I pray?
Behind us and before there swells the din of parting and of bells;
To shoreless Space each moment sails a disembodied spirit away.
From yonder starry lights and through those curtain-awnings darkly blue,
Mysterious figures float in view, all strange and secret things display.

Rumi, 13th Century Persian Poet
The Divani Shamsi Tabriz

When conducting interviews and archival research in Washington during the hot summers of 1998 and 1999, I often walked up from NASA Headquarters to the Smithsonian's Air and Space Museum. This became my favorite place to sit down and review my notes after interviews. In the relative cool of the Museum I would try to make sense of my scrawled notes and jot down my impressions, surrounded by artifacts of aviation and space flight. Sometimes I would wander over to the large model of the International Space Station, secretly reveling in my conceit that I knew more about that particular beast than the rest of the onlookers.

I am indeed fortunate to have been able to convert a lifelong fascination with space into a dissertation topic that still manages to explore some interesting themes of world politics. What follows is an attempt to explore the relationship between foreign and domestic policy-making in the United States through the case of the Space Station. This case presents many unique challenges to the study of international politics, as it bridges the subjects of foreign policy, budgetary politics, and science/technology policy. This complex nexus of fields includes the major actors in American politics but also enters upon the world stage. The aim of this study has been to develop new ways to look at policy-making that transcend traditional sub-disciplinary boundaries in order to develop a better understanding of the language of politics. I also hope to make clearer the exact relationship between foreign policy and the civil space program, an association long acknowledged but never systematically explored. This study, I hope, will be a significant step towards such a systematic understanding.

A vast number of people contributed to this work and helped to keep me sane despite various ills, both related and unrelated to my dissertation. At the official level, I first wish to thank my advisor James Bennett for encouraging me to pursue this topic despite its unconventionality. I also wish to thank the other members of my dissertation committee, Michael Barkun, Margaret Hermann, Harry Lambright, Stuart Thorson, and my exam chair Richard Braungart, for their comments and support.

Many people aided me in an unofficial capacity, offering their advice or simply their attention while I worked out the details of this project. Others thoughtfully read parts of the dissertation or its antecedents. To them I can only offer a simple thank you and acknowledgement: Lynda Barrow, Mark Brewer, Neal Carter, Augusta del Zotto, Johan Eliasson, Agnes Gereben, Terrence Guay, Paul Leib, Marianne Makar, Michael McLeod, Anna Ohanyan, Dexter Payne, Marie Provine, Jeff Seifert, and Anthony Tsougranis.

During my research trips to Washington DC, many kindly gave of their time and energy to help me track down information and people. I wish to thank: Greta Creech, Diana Hoyt, John Logsdon and the staff of the George Washington University Space Policy Institute, Marcia Smith, and the staff of the NASA History Office, Roger Launius (Chief Historian), Nadine Andreassen, Colin Freese, Steven Garber, and Mark Kahn. I would also like to thank those people who admitted me to their offices or homes and took time for interviews, the numerous secretaries and assistants who took messages and helped me set up interviews, the librarians who tracked down arcane publications, and the innumerable people in Syracuse and elsewhere who offered suggestions, advice, and encouragement.

This research was partial supported by two Roscoe Martin Grants provided by the Dean's Office of the Maxwell School of Citizenship and Public Affairs. In addition, the Department of Political Science and the Graduate School at Syracuse University also provided travel support so I could attend conferences to present elements of this research to the broader academic community. I gratefully acknowledge this support.

Finally, I wish to thank my family for enduring rumors of progress and long winded explanations about what I was "writing about." I can only hope that the finished product meets their approval and answers some of their questions.

Responsibility for what follows, of course, lies solely with the author.

Karl Leib
Syracuse, NY
April 2001

CHAPTER ONE

INTRODUCTION: A JOURNEY BETWEEN TWO (POLICY) WORLDS

"We go into space because whatever mankind must undertake, free men must fully share"

John F. Kennedy (1961)

Foreign Policy and the Space Station Program

The irony was almost as grand as the aspiration. In June 1992, the United States and the Russian Federation signed an agreement on expanded cooperation in space. This agreement, part of a broad-based program of US-Russian cooperation, was to lead to a variety of cooperative projects. A major part of this new relationship was a series of joint space missions. In the next few years, American astronauts flew on the Russian *Mir* space station and Russian cosmonauts on the Space Shuttle. The most significant result of this expanded cooperation in space was the invitation to Russia to join the US-led Space Station Project, originally begun in 1984 by cold warrior Ronald Reagan. When Russia officially joined the multi-lateral project in December 1993, media and political leaders alike lauded a milestone in US-Russian relations and a new beginning in the history of space exploration.

The Space Station Project gained more than a new partner and a new name; it began a new chapter with an uncertain future. The troubled and controversial program had a new purpose and a new direction. It was leaving behind one of its most important rationales (competition with the Soviet Union) and replacing it with a new political purpose: post-Cold War cooperation. The Space Station's journey from Cold War icon to symbol of cooperation is important and intriguing. However, while foreign policy is usually identified as a component of the American space program, the role that foreign policy plays in the space program has rarely been systematically analyzed.

Many reasons, ranging from pure science to national security, have been given for the Space Station Project (SSP) since the early 1980s when the project gestated in the minds of engineers, space officials, and sympathetic politicians. At the back of many of these justifications have been concepts of national interest and power. In 1993 the foreign policy dimensions of the Space Station finally took center stage. This was best symbolized by the project's new designation as the *International* Space Station. In broader terms, the Space Station exemplifies a phenomenon of politics often overlooked by scholars: the role that foreign policy has played in domestic policy-making. The SSP reveals much about the interaction between foreign and domestic politics and is a prime example of the association of technology and national power that exists at the core of science and technology policy.

Theoretical Issues To Be Examined

The first theoretical issue examined here is the role that foreign policy plays in the domestic sphere of politics. In one sense this is a concern about how foreign policy influences domestic policy-making. Pressures external to the state often produce changes in domestic policy. This may take several forms: influencing decisions, shaping the issue agenda, and defining national concerns. Another factor is the strategic *use* of foreign policy arguments in the domestic policy arena to build public or elite support for a desired end. It is the concern of this study is to identify how foreign policy-style arguments, ideas, images, and language are employed within the domestic political arena.

A second theoretical issue discussed here is policy-making for space and the justifications and arguments used in the public policy discourse. Domestic policy-making for space is analogous to other fields of government activity with the exception that national security and foreign policy are far more relevant in the political discourse surrounding the space program than in most other domestic government programs. The interaction between foreign policy and space policy is poorly understood. This study shall address the issue of how international politics interacts with decision-making for the US space program, as experienced in the Space Station Project.

Space is a politically relevant area for several reasons. Space programs (civilian and military) are important science and technology sectors in many countries and the recipients of substantial government largesse. Major actors include national governments and large private corporations, who exist as both producers and consumers of space related services.[1] The field is highly competitive. However, nations have also cooperated in space and examples of cooperation and competition exist in all aspects of space exploration and use. Just as nations have competed in space for purely political reasons, cooperation has at times been seen as an end in itself. However, nations cooperate in one area of space while simultaneously competing in another. What states do in space, and how they simultaneously cooperate and compete in those activities, are political issues that bridge domestic and foreign policy establishments. As the commercial use of space expands in the 21st century, this bridge between domestic and foreign policy will become more important. Most studies of space policy have tended to focus on the domestic setting of policy-making, particularly the organization and personalities involved. A great deal of attention has been given to historical accounts of space missions, administrative studies of organizations, and international legal analyses. There has not been a systematic foreign policy-based analysis of the US space program or any projects within that program.

The thesis of this study is that foreign policy plays a greater role in the framing, development, and implementation of domestic policies than has been previously assumed. Although important work has been done on the foreign-

[1] Several countries have active space programs. The United States and Russia are the best known and most advanced. China, Japan, India, Israel, Ukraine and the 14-member European Space Agency, have the ability to launch satellites and to conduct space science research. Other countries, including Brazil, have developing space programs. There are also several private launch service and space-based service providers in the US. Additional corporate and government actors (as well as alliances between private and public sectors) continue to emerge.

domestic policy nexus, notably Robert Putnam's Two-Level Game thesis and James Rosenau's Frontier model, the importance of foreign policy in the domestic policy-making process deserves greater attention by international relations scholars.[2] Along with the influence of domestic politics on foreign policy-making, the international environment, and a state's policies to deal with that environment, will rebound on its domestic policy. Foreign policy issues can also be consciously *employed* by domestic elites to promote domestic agendas. This study furthers the analytical understanding of the relationship between American foreign policy and space policy, generating a broader understanding of the relationship between domestic and foreign policy-making.

US Foreign Policy

The objectives of US foreign policy since 1945 have included several intertwined strands. The Cold War (1946-1990) was dominated by the policy of containment, which itself was a cluster of policies. The first and foremost American foreign policy goal during the Cold War was cooperation with allies, both fellow democracies and anti-Communist non-democracies. This policy was formalized through the establishment of alliance systems, the most important being the North Atlantic Treaty Organization (NATO). Close cooperation with other major capitalist democracies through the G-7 summits and the General

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[2] Robert Putnam, "Diplomacy and the Domestic Politics: The Logic of Two-Level Games". *International Organization* 42 (1988): 427-60; James Rosenau, *Along the Domestic-Foreign Frontier: Exploring Governance in a Turbulent World*. (Cambridge (England): Cambridge University Press, 1997).

Agreement on Trade and Tariffs was the second track of this policy. These tracks combined with the waging of a more or less peaceful struggle against the Soviet Union in concert with formal American allies and with tacit partners like China. Simplified, this long-term strategy sought political, economic, and military containment of the USSR, although in practice, this policy was far more complex and varied that summarized here.

In the wake of the Cold War, American interests shifted from confrontation to conciliation and the promotion of democracy and economic development in the former Soviet Union and East-Central Europe. These states were brought into the various "Western" security and economic institutions. The breakup of the Soviet Union shifted US security concerns to change from global competition to containment of regional conflicts. The promotion of US national prestige as leader of the so-called "Free World" survived the end of the Cold War as the US took its place as the world's "sole superpower" and the leader of liberal democracies. American leadership also embodied the goal of continued American hegemony through institutions like the World Trade Organization (WTO) and World Bank, as well as maintaining a commanding international role for the US. As the position of the US became more singular as the "sole superpower," the maintenance and operation of that hegemony became even more vital. In reality, the US became what may be called the "linchpin" state. While the US is unable alone to impose its will on the world, without its support, effective action is virtually impossible at the global level.

Additional issues have become more important and complex during the Post-Cold War era. The stability and expansion of the non-proliferation and arms control regime has become a key US foreign policy goal, especially as chemical, nuclear and biological warfare technologies have spread. Second, embracing the notion of the "Democratic Peace," US policy has been to encourage the transition to democracy in the former Soviet bloc and elsewhere. Stimulating democratization of former Cold War rivals included integration of East-Central Europe into NATO, as well as the participation of Russia in the G-7 (now G-8) system. Finally, economic competition has increased in importance as the US has endeavored to improve its trade position vis-à-vis other states (including its old and new political partners).

Although specific issues have fluctuated, these broad policy goals have remained fairly consistent across time as vital US foreign policy interests. Equally consistent has been the linkage of foreign policy goals to the US space program. The fulfillment of many of these general foreign policy goals has been used to justify and promote a wide variety of civilian space expenditures. Since the 1950s, foreign policy has been inter-twined with other motivations to form the core missions of the US space program. In addition to the scientific and economic benefits associated with space, expenditures are justified for their presumed benefit for national power and influence. This has ranged from vague claims of national security, prestige, and national power, to more specific policy benefits, such as cementing political relations with traditional allies (and transitional Russia), demonstrating American national capabilities to other states, and using science and technology to stimulate economic growth.

The International Space Station

The focus of this study is the United States civilian space program, with primary attention paid to the Space Station Project. The central aim of this study is to identify how American foreign policy goals and agendas have been used to promote and justify US space policy and how this has changed over time. The SSP coincides with a major period of transition in US foreign policy. The SSP, being a carry over from the Cold War, reflects the turbulent transition of that foreign policy exceeding well. The generic purpose of this study is to show how a complicated area of government activity is publicly represented and promoted by officials, how foreign and domestic policy-making are linked, and how they interact with each other.

While proposals for a space station date back to the 1960s, the current project can clearly be identified as beginning in 1980-1983 when NASA began lobbying Congress, the White House and American allies for a space station project. This period culminated in a 1983 decision by Ronald Reagan to start the Project. In 1992-3 the Space Station project was “restructured” and Russia was invited to join the project. This study concludes with an analysis of the Space Station’s transition from a Cold War symbol to a new identity and mission in the post-Cold War era.

Partners and Contributions

The International Space Station Project (ISS), as the SSP is currently titled,[3] is the largest and most expensive construction project ever attempted in space and the primary project that NASA and its partners will pursue for the next decade. Briefly, the Space Station is designed to be an orbiting research laboratory for bio-medical and industrial research. Several different configurations and operational plans have been proposed (see Chapter 5 for a complete historical description). As currently envisioned, the completed ISS will consist of a modular structure 109 meters (356 feet) in length and 88 meters (290 feet) across. The massive structure will orbit at 350 kilometers (220 miles) above the Earth and shall contain 6 science labs and 1217 cubic meters (43,000 cubic feet) of pressured space for its seven-member crew.[4] When complete, the Space Station shall have a mass of 430,000 kilograms (950,000 pounds).[5]

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[3] The project currently called the International Space Station began in 1984. It was not given a formal name until 1988 when it was christened *Freedom*. The Project was briefly referred to as Space Station *Alpha* in 1993 and numerous other names have been proposed. After 1994, the term International Space Station came into standard use, and previous names were gradually abandoned. At present the Station does not have any formal name, although *Alpha* has returned as a semi-official designation. Unless a specific time period is being discussed, the project will be generically referred to as the Space Station Project or the SSP. When discussing space stations in a general sense, lower case letters are used.

[4] The completed Station will have roughly the same as the internal volume of a Boeing 747 (NASA, "Space Station Assembly," NASA [Web Page], Accessed 24 September 1999). http://station.nasa.gov/station/assembly/index.html, 1)

[5] NASA. Office of Space Flight, "Space Station Slide Show," NASA [Web Page], Accessed 7 March, 1998. http://www.hq.nasa.gov/osf/slide_show, P6 Slde6)

Approximately forty-seven launches by American Shuttles and Russian rockets will be required to assemble the Space Station.[6] At this writing, several segments of the ISS have been launched. The Russian-built, American-funded Control Module, *Zarya* ("Sunrise") and the American-built *Unity* module were launched separately in late 1998. The service module *Zvezda* ("Star") was launched in July 2000 and the first three-person crew followed in November 2000. The first crew orbited until March 2001 when they switched places with a second crew. Construction continues and assembly is scheduled to be complete around 2004.[7]

Sixteen countries are contributing to the Space Station.[8] The US is providing the bulk of the Station hardware including a crew habitation module and laboratory. Russia, the next major partner, is contributing service modules, laboratory segments, and a crew escape vehicle. Several Station components will be launched using Russian rockets. The European Space Agency (ESA) and Japan are each contributing laboratory modules.[9] Canada is contributing a more elaborate version of the Space Shuttle's manipulator arm for Station

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[6] NASA, Lyndon B. Johnson Space Center, "International Space Station Assembly Sequence" (Houston, Texas: NASA Lyndon B. Johnson Space Center), 1997.

[7] NASA, Lyndon B. Johnson Space Center, "International Space Station Assembly Sequence" (Houston, Texas: NASA, Lyndon B. Johnson Space Center), 1999.

[8] The 16 countries participating in the ISS are: the US, Russia, Japan, Canada, Brazil, and 11 of the 14 members of the European Space Agency (Belgium, Denmark, France, Germany, Great Britain, Italy, Netherlands, Norway, Spain, Sweden, and Switzerland). Although Britain has signed the various Space Station agreements, it is currently not financially participating in the project at present (Marcia Smith, "Space Stations," Washington: Congressional Research Service, 1999, 11).

[9] "Japan Focuses Its Station Program on Space Experiments," *Station* Break, August 1990, 3; "Columbus to Launch Europe Into Its Own Station Program," *Station Break*, July 1990, 3.

assembly and maintenance.[10] Canada, ESA, and Japan signed on to the project early in its history and will be referred to as the "original partners." Italy, in addition to its ESA participation, is building three reusable modules to re-supply the Station and return cargo to Earth.[11] Brazil, through a bilateral agreement with the US, is providing hardware to enhance Station research operations.[12] Table 5.2 in Chapter 5 lists the major contributions to the SSP for each country.

The SSP in the Context of the US Space Program

The SSP's expense makes it a prime example of big-budget, federal "big science." Approximately $22 billion was spent on the SSP between 1985 and 1998.[13] The complete cost to construct and operate the Space Station for its projected 10-year lifespan is debatable. Total program cost for 1985-2002 is estimated at $72.3 billion by NASA and $95.6 billion by the Government Accounting Office (GAO).[14] Due to these high and uncertain costs, but also because of doubts about the Station's value, the project is highly controversial. The SSP has faced sharp criticism from the scientific community, from critics of government spending, and members of Congress; the Station has survived

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[10] "Robot Arms, Center Canada's Contribution to the International Space Station," *Station Break*, June 1990, 3-4.
[11] "NASA, Italian Space Agency Sign Memorandum of Understanding". *Station Break*, January 1992, 1, 8; Peter de Sending and Anne Eisele, "Europe, U.S. Forge Deal For Italian Station Work," *Space News*, 10-16 March 1997, 3, 19.
[12] NASA, "NASA Signs International Space Station Agreement With Brazil," Washington: NASA, 1997, 1.
[13] Smith, 1999, 2.

twenty-two attempts by various Congressional panels to cancel the project's budget.[15]

Because it lies on the nexus of international and domestic politics, the SSP is an excellent means of illustrating this study's theoretical and policy concerns. Although the United States initiated the project, it is a major international undertaking. It has included international participation since its inception; therefore the foreign policy dimension of this project has been an integral part of decision-making and policy discourse for this case. The SSP is the primary space project currently under development by the US and constitutes a major percentage of NASA's budget. The Space Station is also an excellent illustration of the transformation of US political life (foreign and domestic) from the Cold War to the present era. Once promoted as a means of competing directly with the Soviet Union, the current political rationale is the cementing US-Russian cooperation, promoting democracy in Russia, and securing nuclear non-proliferation.

Despite a large budget for research, the scientific value of the SSP has been widely debated by observers within and outside of government, including the scientific community. As originally proposed, the Space Station would serve a variety of roles, among them scientific research, technological development and national security. However, many missions have been dropped as the SSP

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[14] Marcia Smith, "Space Stations," Washington: Congressional Research Service, 2000, No Pg. [3].
[15] Smith, 2000, No Pg. [i].

has evolved and costs have risen. In 1984, one hundred and seven missions were foreseen for the SSP.[16] By 2000 the number of proposed missions had shrunk to two.

The work that follows has three theoretical goals. First, it seeks to better understand the interaction of foreign with domestic policy, an area largely understudied by international relations. Second, this study seeks an improved understanding of the nature of policy-making for science and technology to unravel the association of knowledge and power. Finally, it seeks to explicate the ideological elements of US space policy, its policy discourse and assumptions.

The Argument: The View Across a Partially Open Black Box

The Overlapping of Foreign and Domestic Policy

The first theoretical issue that this study addresses is the interaction between foreign and domestic policy-making. The definition of the term "foreign policy" is a complex matter. It is not entirely clear what "foreign policy" means and what activities it describes. A point of departure may be the recognition that foreign policy is a cluster of different phenomena: 1) it is the pursuit of a state's perceived interests, or goals external to itself; 2) the inter-action a state experiences with other states; and 3) the plans and procedures that a state

[16] "Boland Questions Need For Manned Station. Keyworth Says Opportunities Justify Venture,"

prepares for a variety of contingencies. Foreign policy implies an act or plan carried out by an authoritative actor, possibly a nation-state.[17] However, trans-national actors that are not states, like NGO's or multinational corporations, may engage in "foreign relations" with other actors, including states. International organizations, insofar as they have independent institutions may have a systematic set of policies or acts that are in essence "foreign policies." Finally, there has been an increasing tendency for various domestic agencies to be involved in foreign policy-making and coordination.[18]

An additional puzzle posed by foreign policy is the relationship between internal and external policy. At the level of the state, and of the individual, there is an understanding that the domestic political context influences the course of a state's foreign policy. The interaction between foreign and domestic policies poses an additional theoretical dynamic: domestic policy can be influenced by foreign policy interests and ideas as critically as foreign policy may be influenced by domestic politics. The language of foreign policy can enter into the discourse of domestic politics, shaping their direction and content. These elements of foreign policy-making are not well understood. The concept of foreign policy is incomplete and this study shall sharpen the theoretical understanding of what foreign policy is, and it is related to other governmental activities.

Defense Daily, 9 February 1984, 226-7.
[17] Charles Hermann, "Foreign Policy," In *Encyclopedia of Policy Studies*, ed. Stuart Nagel (New York: Dekker, 1983), 275.

Science and Technology in International Relations

The second theoretical issue addressed here is the role that science and technology, both as phenomena and as policy fields, play in international relations. In most international relations literature, science and technology are assumed to be an input to national power but are not analyzed in any systematic way. The role that political decisions have on the generation and evolution of science and technology has also not been thoroughly examined. In the more specific field of space, while many observers have correctly claimed space exploration has been driven by nationalism or power politics, very few have closely examined the foreign policy/national power subtext of space policy rhetoric.

The Discursive Community of Space

The third theoretical issue to be discussed here is the language of the space advocacy community. In decision-making about space, the most relevant parts of this discourse link science and technology to social benefits. Such beliefs can have a major impact on the choice of missions and how missions are conducted. The discourse of space derives from numerous sources. The most important actors in this issue area are political leaders (Presidents and members of Congress), policy-makers and implementers (especially NASA

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[18] Eugene B Skolnikoff, *The Elusive Transformation: Science, Technology and the Evolution of*

officials), and a variety of elite actors and observers (including corporate executives, media, interest groups, and academics). These individuals at times address only each other but also direct their words towards elite and mass publics. Much of the language currently seen in US space policy first appeared in the 1960s during the Apollo program, especially through the statements of John F. Kennedy, NASA Administrator James Webb, and engineer Werner von Braun. This language has reappeared in subsequent decades in many different contexts by different actors, indicating an institutionalization within the space policy community of concepts and language.

The political discourse of space embodies a series of ideas and images that relate directly and indirectly to foreign policy. Foremost is the idea of power. The power of a state is an essential component of international relations theory. Power has numerous forms: military, economic, political (including reputation), and cultural. The use of space programs to pursue foreign policy goals goes beyond mere justification; both the space program as a whole, and many foreign policy objectives of space policy reflect an association of knowledge with power.

Space policy discourse assumes that space exploration is both a source and a demonstration of national power. This conception of national power includes the ideas of national prestige/morale, and the stimulation of scientific-technological capabilities. The need to explore and utilize of space is also a key

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International Politics, (Princeton (New Jersey): Princeton University Press, 1993), 209.

component of this discourse. The "conquest" of space is described as a historically determined process. As John Kennedy suggested in the epigraph to this Chapter, because Humanity is destined to "conquer" space, it is essential that the United States be a leader in that movement.

Space programs such as the SSP exemplify high cost programs with little or no obvious economic return over the short term. Because the expenditure of huge amounts of public money for non-security activities generally must be justified in a democracy, political leaders and administrators must promote and justify government expenditures.[19] In doing so they justify the overall pattern of expenses, defend and promote specific projects, define the missions and goals of particular projects as well as the space program as a whole. The US space program has been identified by many of its supporters as a way to promote national interests, to increase national power, and to achieve a variety of domestic and international goals. The arguments used by these supporters include both symbolic and practical arguments and cover a wide range of foreign policy issues.

The influence of foreign policy and the use of foreign policy rationalizations have both theoretical and policy implications for the US space program. Foreign policy language, images, interests have permeated NASA's

[19] An important exception to this is, of course, defense and intelligence activities. These often receive less stringent public scrutiny. Defense "black" programs are secret even to most members of Congress.

political discourse and institutional culture. Since the beginning of the exploration of space in the 1950s, space and foreign policy have been closely linked. The impetus to develop space technology was stimulated in large part by the pressures of international competition, a drive to promote national prestige, as well as a desire to develop military and intelligence capabilities. While US policy towards space has followed this general pattern, a distinction must be made between the Cold War and post-Cold War periods. During the early Cold War, the US space program was justified primarily as a source of national prestige and security. Over time more justifications appeared and an increasing emphasis was placed on economic and technological issues. While economic and social arguments were made, the dominant rationale was the need to compete with the Soviet Union. The end of the Cold War saw a major shift away from these justifications. Economic competitiveness rose in prominence. Space-related budgets are under increased scrutiny and require new political justifications. In response to these changes there has been a dramatic shift in the justifications given for large space projects. The emphasis is now on different foreign policy goals: international cooperation, stimulation of American economic competitiveness, and monitoring of the global environment.

Therefore, American space policy has witnessed several dramatic shifts over time. However, the core value of national power and a confidence in American know-how persists. In addition, the international environment remains a source of both inspiration and competition. As we shall see, this diverse landscape furnished the SSP with a broad range of political opportunities and challenges.

Research Design

Normative Concerns

The normative concerns that drive this study emerge from a belief that the use of foreign policy as a justification for the space program needs to be explicitly discussed. The implicit assumption that space programs are primarily pursued for political reasons generates cynicism and detracts from the real positive benefits of space exploration. Politically motivated space missions often fail to be sustainable, as witnessed in erratic public interest in the Apollo program. Political motivations often can detract from the scientific value of a mission. For example, the Cold War drama of the “space race” overshadowed the advances in space science that occurred in the 1950s and 1960s. A project that is driven by political factors creates an impression that it has only symbolic value. Such a program, such as the SSP, may be vulnerable to cancellation after large sums have been spent in development. This breeds public cynicism and antipathy towards space activities. The Apollo program’s politics so overshadowed its science, that Lunar exploration, and a vast, almost irreplaceable, infrastructure was abandoned once the goal of “beating the Russians” to the Moon was accomplished. Ironically, it was only the last Apollo mission that had a professional scientist as a member of its crew.

The argument that the US must "keep up" in space is derived from the assumption that security and national power are threatened by other states obtaining "mastery" of space. Competition has had both a military and economic character. The race to the Moon with the Soviet Union and the fear that Europe or Japan will outpace American technology, are common examples of this type of justification. This however reduces space activities to an extension of national competition and can distort policy, producing Apollo-like spectaculars without sustainablity. Claims that the US must be first in space are based on an assumption that space exploitation is a historically determined moment in time. This belief in the destiny of Humanity to colonize space creates several negative pressures. The first is the need to be "first" and trumpet national glory. The second is an over reliance on piloted space flight over robots.[20] The third is the contradiction between cooperating with other states while still trying to remain hegemonic in space. For example, the design and future use of the "International" Space Station has been determined largely by the US, even after Russia joined the project.

These considerations have shaped the course of this research. What follows is more widely targeted. The aim is to better understand the bridging of different policy realms and to systematize our understanding of exactly *how* foreign policy influences domestic policy for space.

[20] The term "piloted" is here substituted for the gendered and increasingly inaccurate "manned."

Method of Analysis

To address the issues discussed above, this study has examined the development of the Space Station Project as it is revealed in the public record, in US government documents, and in the personal recollections of participants. The primary goal of this study is to identify the foreign policy elements that exist within US space policy, identify the different arguments presented on behalf of the SSP, how these arguments evolved over time, and explore the linkages between these two policy areas. Research has been guided by the following questions:

1) What US foreign policy objectives have been cited as justifications for the SSP and related US space policies and programs? More broadly, how have foreign and domestic policy interacted in the US space program?

2) How have national security and national power considerations shaped and permeated the political discourse about space policy? How is space linked to ideas of national power and security?

3) Is there an ideology about space that can be gleaned from official statements on space, and how it relates to the use of foreign policy agendas in space policy?

Although the history of space exploration could provide numerous examples that relate to this study,[21] the focus here is the Space Station Project.

Likewise, the terms "unpiloted" and "robot" are substituted for "unmanned."

[21] The Apollo program is the classic example of domestic and foreign policy interfacing. The European Space Agency represents a multifaceted program designed to promote domestic economic growth, regional integration and international respect. Both are good examples of the

Evidence from other human space flight projects has been used when relevant to the evolution of the SSP. Certain other space science projects with international participation will be discussed to place the SSP in the proper historical context.[22] Because this study focuses on civilian space policies it therefore excludes those programs dealing with the Strategic Defense Initiative ("star wars") missile defense system and other Defense Department programs. A detailed discussion of this study's methodological approach is provided in Appendix 1.

The chapters that follow demonstrate how the SSP is represented and justified in the public record. To identify the foreign policy justifications for space programs, I have examined how space and space policy are represented in the official texts of the key space policy-making actors: NASA, the Executive Branch (the President and Vice President), House and Senate oversight and appropriations committees. Policy-making for space is made at many levels. The process by which a specific project is announced and promoted also occurs at many levels. Therefore, evidence has been drawn from several sources. The first source is the testimony given by government officials and outside witnesses in Congressional hearings and debates. Congressional hearings, particularly those dealing with appropriations, will provide evidence of

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political, economic, and ideological dimensions of space exploration. In addition, the space programs of countries like India and China represent investments in national pride and status as well as science and technology.

[22] Several space projects that NASA has pursued have had international participation and at least one, the International Solar Polar Mission, had a major influence on the relationship

what foreign policy goals are used by government officials to justify, promote, or defend the Space Station. Statements by members of Congress during hearings provide additional information of this type. Congressional hearings are useful because they are partially orchestrated political events. Witnesses are often chosen to represent certain points of view, to put fact claims into the public record, or to provide token opposition. The Congressional material examined here will be considered in this light.

A second source of material has been official statements and speeches by political leaders especially the President. Public statements by administrators and politicians, along with official publications will be valuable evidence of how decision-makers describe, defend or criticize the Space Station Project. Presidential speeches and statements provide information about how the top policy-makers describe space programs. Vice Presidents (especially Daniel Quayle and Albert Gore) are relevant for their role as Cabinet-level coordinator of space policy. These public statements about space are directed both at elected officials who make policy, but also at the media and the public.

The third source of data is the wide assortment of publications produced by NASA. Government publications that describe the SSP represent an organizational attempt at influencing elite and public opinion. These documents, such as NASA's annual *Aeronautics and Space Report of the President*, official

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between the United States and its European partners. This program, and the joint US-European histories, statements and speeches, and agency publications that describe the SSP provided additional evidence of how the SSP has been publicly justified and described. Other government agencies such as the Office of Technology Assessment, the State Department and the Department of Defense have been used as reference sources.[23]

A final source of information has been interviews with former and current officials, staff, policy-makers, and well-positioned observers. Interviews, some confidential and others on the record, provided additional information about the specific decision-making process and the various goals officials attempted to achieve. They have also used to provide insight into how individual decision-makers view space as an issue area.

The images and words used to describe phenomena are important because they can reveal underlying thinking and patterns of beliefs. They can also influence the perceptions held by individuals who employ the images. Integral to all languages are metaphors, which help to ground concepts in reality and to structure perceptions of reality.[24] Metaphors help to familiarize an audience with new or disparate phenomena. While vital in *defining* such difficult

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Spacelab will be discussed in detail in Chapter 4.

[23] Many references from NASA promotional materials, such as booklets, pamphlets, and posters do not always have conventional page numbering. Quotes from such material will be referenced with "No pg." with a page reference calculated by the author in brackets, if appropriate.

[24] George Lakoff, and Mark Johnson, *Metaphors We Live By,* (Chicago: University of Chicago Press, 1980), 3.

phenomena as space flight, metaphors can also *shape* an actor's perception of a phenomenon.[25]

Outline of Study

The next Chapter outlines the relevant theoretical literature and provides a clearer definition of foreign policy and its relationship to domestic policy. Chapter 3 incorporates the theoretical and scholarly study of science and technology policy to the study of world politics. The history of the US space program is presented through the lens of foreign policy in Chapter 4, while Chapter 5 examines in detail the evolution of the space station as an idea and as a government project. A typology of arguments made in favor of the SSP is contained in the following two chapters. Chapter 6 identifies the non-foreign policy interests (political, economic, social) identified as benefiting from space expenditures. Foreign policy-based arguments are discussed in Chapter 7. The Eighth Chapter takes the evidence presented and uses it to construct general theoretical claims about the interaction between foreign policy and domestic policy. A conclusion and commentary are provided in Chapter 9.

The pages that follow cover a broad stretch of history and political activity. Throughout this study, it is important to keep in mind the linkages between different arenas of political activity: intra-agency strategy-making, domestic political maneuvering, and international negotiations. This process,

[25] Linda Krug, *Presidential Perspectives on Space Exploration: Guiding Metaphors From*

and the story of the Space Station, must also be placed in an intellectual context of political science and the politics of science. The various arguments and justifications that will be analyzed in this study revolve around a single dilemma: how may a state enhance its power and control its own destiny. The answer to this dilemma, as will be shown in the case of the Space Station, is a complex mixture of internal and external policies; of rhetoric and symbolism; and adaptation in the face of change.

Eisenhower to Bush. (Westport (Connecticut): Praeger, 1991), 5.

CHAPTER TWO

DANCING ON FRONTIERS: THE LITERATURE OF FOREIGN POLICY AND SPACE POLICY

> Border guards may check passports and customs officials may impose duties, but to conceive of the foreign domestic distinction in this way is to mislead, to mistake surface appearances for underlying patterns.
>
> James Rosenau, *Along the Domestic-Foreign Frontier* (1997)

> Central decision-makers strive to reconcile domestic and international imperatives simultaneously... statesmen in this predicament face distinctive strategic opportunities and strategic dilemmas.
>
> Robert Putnam, "Diplomacy and Domestic Politics: The Logic of Two Level Games" (1988)

IR Theory and Politics Within the State

This study explores two issues of political life from the perspective of international relations (IR) theory and analysis: the interaction between domestic and foreign policy-making, specifically the influence of foreign policy on domestic policy; and the nature of policy-making for science and technology (S&T) issues. The primary interest of this chapter is the nature of the interaction between foreign and domestic politics. The influence of domestic politics on foreign policy-making has been analyzed substantially by scholars; the influence of foreign affairs on domestic politics is less well understood and the use of foreign policy to influence domestic politics has not been fully examined by the IR field.

Grand Theory and the "Black Box"

The separation of foreign and domestic politics is a standard intellectual model both in common parlance and in academic studies. The expression, "politics stops at the water's edge" embodies a claim that is both descriptive and proscriptive: partisan domestic issues *do not* apply to international policy, and *should not* interfere with the national interest. However, this is a model that is honored more in the breach than the observance; US foreign policy has long been a partisan issue, much as any other government activity. The foreign policy environment has also influenced domestic politics in many ways.

The theoretical literature however, has tended to honor more closely the artificial division of foreign and domestic politics. In traditional realist theories of international relations, inter-state and intra-state politics are generally sundered into separate and unequal spheres of reality. Historically, foreign policy and security have been regarded as "high politics," a domain of greater criticality and importance than domestic governance (social welfare and economics). In addition, the reality of international anarchy (for example, the absence of a world government) contrasted sharply with the relative order of domestic affairs and tended to legitimize a differentiation of domestic and international politics. Beyond contrasting domestic "order" with international "anarchy," realist theories of international relations have often explicitly treated the internal politics of states as outside its realm of study.[1]

For realist scholars, the proper focus of IR was the struggle between similarly structured units, all seeking to maximize their position in the world. While regarding the motivations of individuals in both spheres to be largely identical, domestic affairs was defined out of international relations theory and relegated to the "black box" of the state. While it was acknowledged that states had different regime types and culture, this differentiation was not relevant to the study of behavior at the international level. States were viewed as "billiard balls" of like material, merely interacting with each other. Kenneth Waltz and the school of neo-realism posited that the characteristics of the units were less important than their relative power positions in the international system. Waltz himself conceded that neo-realist analyses of the international could not reveal the workings or predict the actions of specific states; as a systemic theory, IR was not intended to be a theory or explanation of foreign policy.[2] What realism sought to identify was an understanding of broad patterns, the "actor-general" behavior.[3] However parsimonious, this exclusion of unit-specific characteristics and the relegation of internal politics to a black box, limit the utility of realist and neo-realist theories. To understand fully the dynamics of international politics, a

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[1] Realist scholars do acknowledge that international politics, like national politics, is governed by human nature (Hans Morganthau, *Politics Among Nations: The Struggle for Power and Peace,* 2nd ed. (New York: Alfred Knopf, 1954)).
[2] Kenneth Waltz, *Theory of International Politics* (New York: Random House, 1979).
[3] Valerie Hudson and Christopher Vore, "Foreign Policy Analysis Yesterday, Today, and Tomorrow," *Mershon International Studies Review* 39 (1995): 209-38.

deeper look at foreign policy decision-making and domestic politics is required.

However, not all IR scholars completely bifurcate the state from the international system. Many feminist scholars reject the realist dichotomy between domestic and international politics, just as they reject the bifurcation of society into public and private spheres. Both in definition of what constitutes international politics, and in definitions of security, feminists seek to blur the distinction between the international and domestic, while traditional concepts are recast; Ticker's redefinition of "security" includes not just national security but *individual* security.[4] In this conception, international relations becomes more accurately *world* politics; it is a broader field of concern, encompassing trans-national, national and *personal* politics.[5]

In recent books, James Rosenau has developed the notion of the "Frontier" between the international and the domestic spheres of politics.[6] Stressing a shift in loyalties and bases of authority, Rosenau argues that foreign and domestic politics are in reality a single "seamless web" of activity.[7] Authority itself is no longer necessarily based or centered on territory. Other actors (non-governmental organizations and multinational corporations) have

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[4] J. Ann Tickner, *Gender in International Relations: Feminist Perspectives on Achieving Global Security,* New Direction in World Politics, ed. John Gerard Ruggie (New York: Columbia, 1992).
[5] Cynthia Enloe, *Bananas, Beaches and Bases* (Berkeley: University of California Press, 1990); Tickner 1992
[6] James Rosenau, *Turbulence in World Politics: A Theory of Change and Continuity* (Princeton: Princeton University Press, 1990); James Rosenau, *Along the Domestic-Foreign Frontier: Exploring Governance in a Turbulent World* (Cambridge (England): Cambridge University Press, 1997).

emerged in parallel to, and occasionally in opposition to, nation-states. This is not necessarily new, as the nation-state was never the sole actor in world politics, but the nature of those politics has fundamentally shifted. Concurrent globalizing and localizing pressures on states have changed the role and hegemony of state institutions. Therefore, according to Rosneau's interpretation, international and domestic politics are not separate realms but are part of a single multi-actor type domain of reality that has become more complex, diverse, and less state-centric.

Another area of study that integrates the study of domestic and foreign policy is the foreign policy decision-making literature. Although usually considered to be part of the IR field, works by Graham Allison and Irving Janis have explored the dynamics of domestic American political events.[8] Foreign policy decision-making scholars have focused on the role of individuals alone and in small groups. In particular, groups, imbedded in the domestic politics and policies of their state are the operators of foreign policy. Allison's organizational processes and bureaucratic politics models based on the Cuban Missile Crisis, stress the inter-relationship between domestic political action and foreign policy decisions. Allison uses the unified rational actor model (defined as Model I) as a point of departure, useful to make a "first cut" at specific decision-making case. However, Allison finds Model II (Organization Output)

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[7] Rosenau 1997, 4
[8] Graham Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (Boston: Little, Brown and Company, 1971); Graham Allison and Philip Zelikow, *Essence of Decision:*

and Model III (Bureaucratic Politics) more useful for understanding the decisions made by President Kennedy and his advisors. The group dynamics of Groupthink, developed by Irving Janis and elaborated by Paul 't Hart, are equally applicable to foreign policy, local government or informal social groupings.[9] As most decisions are made or implemented by groups, collective behavior is relevant to both the study of domestic decision-making (a city council) or foreign policy decision-making (the National Security Council).

In functionalist literature the line between domestic and international politics is drawn as a moving target. Functionalists anticipate the gradual transfer of governance functions from the national to the global level. The works of David Mitrany define politics as the carrying out of governmental functions; the basis of government, whether local, national, or international, is the provision of services to individuals.[10] The "spill over" model argues that cooperation in one area will lead to cooperation in related areas. Derived from some of Mitrany's thinking on functional cooperation is the work of Karl Deutsch et al (1975).[11] Deutsch's book uses social communication, trade and identity as means to describe a community beyond the nation-state. Because of his emphasis on these fields, it is similar to Mitrany in using a social definition of

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Explaining the Cuban Missile Crisis, 2nd ed. (New York: Longman, 1999); Irving Janis, *Groupthink,* 2nd ed. (Boston: Houghton Mifflin Company, 1982).

[9] Janis 1982; Paul 't Hart, *Groupthink in Government: A Study of Small Groups and Policy Failure* (Baltimore: Johns Hopkins University Press, 1990).

[10] David Mitrany, *The Functional Theory of Politics* (London: London School of Economic and Political Science, 1975), 171

[11] Karl Deutsch and others, *Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience* (New York: Greenwood Press, 1975).

politics. However, Deutsch does not entirely accept the functionalist argument, seeing cooperation as a function of other political conditions.[12] This change is psychological as well as political. Deutsch and his co-authors are also less clear about the distinction between national and regional integration than Mitrany. In addition, they do not extend their ideas of integration to the global level.

Limits to Optimal Decision Making: Ideas and Ideology

A second factor that has limited understanding of IR and foreign policy is the common assumption of rational decision-making. Rational decision-making is usually defined in Weberian terms as cost-benefit analysis to maximize a desired end. Many scholars challenge the assumption that all decisions have material objectives, rationally pursued. They have sought to identify factors that preclude or undermine rational decision-making.[13] However, decisions by individuals or groups may not be made on a rational basis. There are also *non-rational* values and preferences that motivate individuals; it is individual motivations which are the most important, as groups are collectives of individuals and will experience the same drives as their members. Non-rational motivations include ideological principles, religious beliefs, moral values, a sense of historical meaning, and esthetic considerations. These are not

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[12] Deutsch 1975, 81

[13] The rational decision-making model is undermined by the fact that people may hold contradictory preferences and values. There are also occasions when information is gathered after a decision to rationalize it.

necessarily *irrational*, in the sense of non-logical or intellectually vacuous. Rather, they are motivations which do not easily lend themselves to cost-benefit evaluations in material or monetary terms. Self-sacrifice may materially costly to the individual, but nonetheless pursued for a goal that transcends materialism. Preferences may even produce a material cost for a non-material gain. In non-rational decision-making, value is defined psychologically, as the furtherance or support of a principle or ideal.

Explanations derived from the political psychology literature emphasize the human dimension of decision-making and are vitally important for understanding the motivations and boundaries of foreign policy decision-making. Scholars in this tradition emphasize the role of perception, culturally bound world-views, and information processing for decision-making. These factors undermine purely "rational" decision-making. Political psychological studies of foreign policy-making, both by individuals and collectives, "break open" the realist black box state to reveal the importance of individual perception and ideology. Jervis' (1976) discussion of the role of perception and misperception, and Vertzberger's (1990) analysis of individual information processing, demonstrate that the actions of states depend on individual interpretations of the world to a greater extent than rational decision-making models suggest.[14] The perception of reality helps to shape an actor's interaction with that reality.

The role of ideology in the development of foreign policy goals and decisions is also important, insofar as it may undermine attempts at Weberian rational decision-making. Ideology may be viewed in two ways. In one sense, similar to Vertzberger's information processing model, ideology can act as a filtering device that shapes, accepts or rejects, and interprets incoming information. Ideology acts as a medium through which information is filtered and decisions are channeled.[15] A second way of viewing ideology is as a source of ideas or values. Actors may draw opinions from preconceived or prepackaged sets of ideas about the world. Ideology, in the broadest understanding of the term, includes assumptions about the world and about other people. Hunt (1987) defines ideology as an "interrelated set of convictions or assumptions that reduces the complexities of a particular slice of reality... and suggests appropriate ways of dealing with that reality."[16] Carlsnaes (1986) identifies ideology with three related phenomena: ideologies are political doctrines, they influence an actor's motivations, and they are purported to benefit a broader interest.[17]

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[14] Robert Jervis, *Perception and Misperception in International Politics* (Princeton (New Jersey): Princeton University Press, 1976); Yaacov Y.I. Vertzberger, *The World in Their Minds: Information Processing, Cognition, and Perception in Foreign Policy Decisionmaking* (Standford (California): Standford University Press, 1990).
[15] Walter Carlsnaes, *Ideology and Foreign Policy: Problems of Comparative Conceptualization* (Oxford, England: Basil Blackwell, 1986).
[16] Michael Hunt, *Ideology and US Foreign Policy* (Hew Haven: Yale University Press, 1987).
[17] Carlsnaes 1986.

Vertzberger, while only briefly mentioning ideology, discusses how information is processed through an ideological system. Values and pre-existing ideas shape the search for information and the way information received is used.[18] Jervis, in his classic treatment on perception and misperception in foreign policy-making, describes how belief systems, not limited to political ideologies, influence the actions of decision-makers. Decision makers, according to Jervis, strive for consistency between new information and pre-existing beliefs.[19] Values and beliefs are not rational but emotional, and are used to impose order on an uncertain or an unknowable reality.

World-views, like value preferences, do not have to be monolithic or even internally consistent. Decision-makers may choose from a diverse menu of possible images about the world. Hunt (1987), in his analysis of racial stereotypes in US foreign policy, offers an excellent example of how individuals (not only political leaders but intellectuals and journalists), can draw on a vast reservoir of often contradictory images. Hunt describes how American popular culture and political discourse alternately portrayed Latin America as an attractive, fair-skinned *señorita*, or as a dark-skinned male savage, depending on whether a positive or negative image of the region was desired.[20] Similarly, the discourse of space advocates may draw from a wide range of images. Space may be described as a competitive arena similar to age of exploration

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[18] Vertzberger 1990.
[19] Jervis 1976.
[20] Hunt 1987.

while simultaneously embracing cooperation for the betterment of all Humankind. The selection and construction of images depends on the context of the argument and the intended audience. In all cases, they are intended to promote certain ideas.

Foreign Policy: Definition and Scope

The Traditional Definition

The definition of foreign policy is somewhat unclear. A traditional formulation is cited by Hermann (1983): "the plans, goals, and actions of national governments directed at entities outside the nation."[21] These plans are both purposive and directed at actors outside of a decision-makers' jurisdiction. Carlsnaes also focuses on authoritativeness and intention when defining foreign policy. In his definition, actors are defined as sovereign and acting towards other actors outside of their territory.[22] Foreign policy is directed *outward* towards other actors or towards the whole international environment.

These definitions are fairly narrow in that they focus on "sovereign" institutions (i.e. nation-state governments), and not on the many transitional actors who engage in relations with states and with each other. Trans-national actors, like NGOs, inter-governmental organizations, multinational corporations, and sub-national governments, are all important to international politics, a fact increasingly appreciated by scholars. Their decision-making processes and

[21] Hermann 1983, 269.

activities at the international level are generally not regarded as "international relations," as that is a privilege reserved for states. With the sole exception of the European Union, which is a nascent foreign policy actor, this definitional restraint remains dominant.

The world society approach, championed by Burton (1972), does not consider the world to consist only of nation-states, but a complex web of institutions, identities and political-economic-social relationships. Burton's work explores an alternative conception of IR by embodying the idea that world politics constitutes a form of society. Burton describes his conception of politics as the "cobweb" model.[23] The world society model is a network of systems and overlapping subsystems that exist at different levels of analysis; together they constitute the whole of world politics. Burton contrasts this image with the billiard ball model employed by neo-realism that includes only relations between states. This billiard ball model is partially accurate, as states remain central actors, however it is a decreasingly relevant model for world politics.[24]

The classic definition of foreign policy is also missing the *internal* dimension of foreign policy-making. The general thrust of a foreign policy action or decision may lie outside of an actor's territory or jurisdiction, but the motive for action may be within that territory. A domestic audience may be just as important, and at times more important, than an external audience; foreign

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[22] Carlsnaes 1986.
[23] John Burton, *World Society* (Cambridge, England: Cambridge University Press, 1972), 35.
[24] Burton 1972, 28.

policy statements or acts may be done primarily for domestic reasons. Certain domestic actions may have profound foreign policy implications; the change of a regime, a shift in domestic political coalitions, or the change of government can alter a state's foreign policy alignment, its strategic interests or foreign policy strategy.

Foreign policy can also be defined to include those policies that relate to a state's ability to act internationally and its position vis-à-vis other states. This includes policies that do not directly involve other states, such as military preparations, which are a domestic type of action but with clear relevance beyond state borders. A state may develop nuclear weapons as part of a domestic political agenda, but that decision will have widespread international relevance. Foreign policy goals and actions can go beyond influence and direct certain domestic policy actions. A perceived external threat may require a shift in national budgets to increase military spending or other state activities. For example, the launch of *Sputnik* in 1957 was a major impetus for the reform of federal education policy in the form of the National Defense Education Act.[25]

Similarly, foreign policy can have a profound influence on domestic politics. The Cold War period produced a major change in the nature of American politics, facilitating the enlargement of government and the creation of a large peacetime military. It also created a context within which American foreign and domestic policy debates were to be fought. John White (1998) describes the dramatic influence of the Cold War on American domestic politics, largely defining the parameters of the "political mainstream." The language of fighting communism was imported into partisan battles between Republicans and Democrats, and between the right and the left.[26] This language continues to have an effect today, as "socialism" remains a politically unacceptable ideology while the concept of "national security" continues to have tremendous rhetorical power.

Symbolism and National Prestige as Foreign Policy

There are also less tangible dimensions of foreign policy. A symbolic and intangible foreign policy notion is the promotion of national prestige or reputation. Raymond Van Dyke (1964) identified several interpretations of "national prestige" in the context of the Apollo program. One way to interpret national reputation or prestige is as a demonstration of power and national capability, revealed in the pursuit of and the ability to achieve a specific goal.[27] A second interpretation of prestige is national self-image and the confidence a population has in its state. In the wake of *Sputnik,* some observers, including NASA Administrator James Killian feared that the United States was in danger

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[25] Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958* (Westport (Connecticut): Greenwood Press, 1981).
[26] John Kenneth White, *Still Seeing Red: How the Cold War Shapes the New American Politics,* Updated ed. (Boulder (Colorado): Westview, 1998).
[27] Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).

of losing its self-confidence as a nation: "Confidence in American science, technology, and education suddenly evaporated" after *Sputnik*.[28]

Prestige may consist of status among nation states, which although legally equal, exist within a hierarchy of perceived importance that does not always match objective measures of power or wealth. Many small states enjoy the symbols of sovereignty but are "states" only by definition, as they have limited resources for action. The small states of Micronesia and the Marshall Islands are represented in the UN, but their defense and monetary policies are determined by the United States. The status of a country includes factors such as reputation for integrity, neutrality, or historically defined moral authority. Reputation includes the credibility of a state in specific types of activities, or in the linkage of words and actions. Status can be consciously developed through symbolic actions, image building activities and the application of power, either in its hard (military) or soft (economic, social) forms. Symbolic and prestige-laden actions can enhance other forms of power.

There are in fact "elites" among states, such as nuclear weapons states, mediating neutrals, or regional leaders. Some states hold more perceived "status" due to objective factors: GNP, population, and the possession of nuclear weapons. However, subjective factors also influence status. Perceived leadership in science, technology, sports, or world culture, are all subjective

[28] David Callahan and Fred Greenstein, "The Reluctant Racer: Eisenhower and US Space Policy," In *Spaceflight and the Myth Presidential Leadership*, ed. Roger Launius and Howard McCurdy (Urbana (Illinois): University of Illinois Press, 1997), 27.

components of status. States can work to develop status-providing characteristics by various actions: developing nuclear weapons, sponsoring key diplomatic meetings, hosting the Olympics, or sending men to the Moon.

The Interaction Between Foreign and Domestic Politics

Robert Putnam's classic, "Diplomacy and Domestic Politics: The Logic of Two Level Games," presents a dynamic model of foreign and domestic policy interaction. Recognizing that diplomatic negotiations are simply the first stage of a process, Putnam argues that international negotiations are two level "games." The first level involves negotiators coming to an agreement with each other. Level II consists of each set of negotiators securing ratification by their home governments, publics, or both.[29] Any agreement made must satisfy the ratifying authority of both sides: "any successful agreement must fall within the win sets of each of the parties to the agreement."[30] Foreign policy, according to this model, has a domestic component. This includes ratification procedures but also the need for negotiators to secure an agreement that *can* be ratified (and convince their counterparts that they can secure ratification). Putnam further notes that negotiators can use the ratification stage to enhance their bargaining position by excluding options on the pretense that they could not be ratified.[31]

[29] Robert Putnam, "Diplomacy and the Domestic Politics: The Logic of Two-Level Games," *International Organization* 42 (1988): 436.
[30] Putnam 1988, 437-8.
[31] Putnam 1988, 452.

Putnam's model is useful in understanding one way in which domestic politics extrudes upon international politics. However, there are additional ways in which these two domains can be bridged. A division between a state's internal and external policies is often difficult to justify when specific policies are examined. Domestic political culture clearly shapes the foreign policy of states. It is not necessary to accept the more radical claims of democratic peace theory to acknowledge that different regime types often pursue different styles of foreign policy. Economic relations between states are another obvious bridge between domestic and foreign affairs. The influence of national culture on foreign policy-making is more controversial, but some general observations can be made. Broad cultural trends, such as American isolationism, may influence policy. A state's preferences for allies may reflect ethnic affiliations, as seen in the Anglo-American partnership. National history also can create a logic that persists in policy-making after the original conditions change, as witnessed in economic and political ties between former colonial powers and their now independent colonies. Such cultural factors can influence the focus of a state's international concerns, its choice of allies, perceived enemies, or decisions about war and peace. Finally, domestic interest groups can be a source of pressure or influence on the conduct and direction of a state's international affairs.

Issue Convergence

There are several different dimensions to the interaction between domestic and foreign policy. First, there may be a convergence of elite interests within a state on a particular issue. Domestic policy elites and those charged with foreign policy-making may have a common interest or goal. A policy option may reflect both a state's domestic and its foreign policy interests. Both domestic and foreign interests may be defined as national interests, as either can influence a state's power and security. A good example of convergence is the Federal-Aid Highway Act of 1956, which promised positive benefits for *both* the national security establishment and economic interests: improved ground transportation that could be used for both commerce and military mobilization.

An additional example is the decision by President John Kennedy to initiate the Apollo Lunar program. The Apollo Program represented an important point of convergence for Kennedy, NASA officials, and certain Congressional leaders. Two separate but near simultaneous events threatened both the domestic and foreign standing of the Kennedy Administration: the launch of the first man into space by the Soviet Union and the Bay of Pigs fiasco. The Apollo program offered a solution to the "space race" and also a distraction from the debacle in Cuba.[32] Domestic worries about the U.S. lagging

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[32] See Michael Beschloss, "Kennedy and the Decision to Go to Moon," in Launius and McCurdy, 60; John Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge (Massachusetts): MIT Press, 1970), 4.

behind in space, combined with foreign policy concerns, created a rare moment when diverse actors converged on a single policy idea.

Foreign Policy as Justification.

Domestic policies may be promoted, defended, or justified by reference to presumed foreign policy interests. Domestic policies may be changed to suit a state's foreign policy interests or concerns. In such cases, a foreign policy interest is presented as a reason to act domestically. A domestic action itself may be promoted as necessary for strengthening or maintaining a state's general position in the international system, or against specific states. Sometimes very different issues can be linked, such as education and national security. The National Defense Education Act (NDEA), passed in the wake of the 1957 *Sputnik* "crisis," provided federal money in the name of national security to improve American education and encourage the study of math and science. Although the proposed policy (federal grants to education) existed for several years prior to *Sputnik*, the Soviet space triumph provided the key opportunity for supporters of the plan.[33] Over US$1 billion in money was provided for secondary schools, colleges, and individual students through the NDEA.[34] Supporters of education reform saw the *Sputnik* launch as the chance to get a favorable bill passed an otherwise reluctant Congress.

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[33] Clowse 1981.

[34] Sidney Sufrin, *Administering the National Defense Education Act* (Syracuse (NY): Syracuse University Press, 1963), 2.

Similarly, the federal program to improve existing interstate highways and build new roadways was presented as both a commercial and a military necessity. In the late 1940s many observers and government officials viewed the existing national highway system as inadequate. The defense rationale, that roads were needed for military transport and for civil defense purposes, was cited along with commercial justifications.[35] In cases such as these, foreign policy interests generated reasons to act domestically, often in a conscious manipulation of a sense of crisis and political "opportunism."[36] The real threat of nuclear war was cite by then-Vice President Nixon in a 1954 speech promoting the federal highway funding. Nixon, following President Eisenhower's direction, claimed that an extensive highway system was vital to ensure national security in case of "atomic war."[37] A crisis creates opportunities for unpopular or ignored policy options and advocacy groups to have an influence on government.

Foreign Policy To Frame Domestic Policy

A third relevant factor is the use of foreign policy to frame or define particular domestic policies or programs. While the domestic environment often shapes policy goals and expectations, the discourse of foreign policy can also enter into the policy discourse to influence how domestic politics are framed. The importation of ideas, images, motivations, and even enemies from foreign

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[35] Richard F. Weingroff, "Federal-Aid Highway Act of 1956: Creating the Interstate System," *Public Roads On-Line* (Summer 1996), 9.
[36] Clowse 1981.
[37] Weingroff 1996, 6.

to domestic politics comes in several forms. The most important security-related concept that can be applied domestically is the notion of an external threat. Real and perceived threats from the international environment can be a startling stimulus for a variety of domestic political action. External dangers (real or imagined) can stimulate public or elite demands for action. Direct threats, such as an actual or immediate foreign attack can radically alter a state's domestic policies and even its form of government. A good example of this is the "red scare" of the 1950s. Here, a clearly defined foreign threat was incorporated into American politics and social life through a search for more vaguely defined domestic enemies linked to the Soviet menace.[38] The need to respond or head off an external threat can be manipulated by political leaders to change domestic policies or to support preferred policies, such as policies to promote fuel conservation in the 1970s, or the space program during the 1960s.

Threats can come in many forms and many disparate phenomena can be defined as threats. Military deployments or capabilities are the most direct form of threat. Some US policy-makers saw *Sputnik* as a threat for the implied advances in Soviet missile technology, not the satellite itself. Threats may be also economic in nature. The US trade imbalance has been viewed as a threat to American societal welfare and its international strength. Likewise, US dependence on imported oil (highlighted by the 1973 oil embargo and the Gulf

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[38] White 1998.

War 17 years later) has frequently been seen as a threat to US security and sovereignty. Threats may also be societal. The Cold War with the Soviet Union was not only an international political struggle, but also a struggle against communist influences and for the "American way of life", however loosely defined. The "War on Drugs" adopted a military metaphor to emphasize the threat to the American way of life from illegal drugs produced abroad but consumed domestically.

The concept of "threat" is an important part of foreign policy-making, as it helps to define how a state views the international environment, other actors in that environment, and its own priorities. The NDEA was explicitly tied to a presumed "national emergency." Cuts to the NASA budget have been described as threats to the future competitiveness of American industry and the prosperity of future generations of Americans.[39] As shall be seen, the concept of "threat" is a very malleable one.

Comparison

A fourth way that foreign policy can enter into domestic politics is by way of comparison. States do not exist in a vacuum and comparisons to other states are central for a state's perception of security. Likely enemies and economic rivals are often used to promote domestic action. The most common example

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[39] Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future," NASA Historical Collection, 1994; Daniel Goldin, "The Goldin Interview," Interview by Alan Ladwig, *Final Frontier* (October 1992), 22-3, 50-3.

of this sort of comparison is the use of statistical analyses of health, crime, education standards, or R&D investment. Comparative statistics are used domestically (by groups in and out of government) to support increased attention to particular issues. When statistics show the US falling behind or failing in certain category of welfare goods, such as infant mortality or math skills, this may be used to imply several things. First, since other states have achieved better standards, improvement is clearly possible. Second, improvement is important, as the country's comparative economic strength and ability to compete internationally is determined by the health and skills of its workers. A state's power is defined comparatively, not in isolation. Finally, a country (especially "our" country) must strive to be first in all things, for reasons of national pride if not for the actual benefits of the things themselves. Comparisons between the US and Soviet educational systems were key in building support of the NDEA. Years of criticism of educational system and its inadequacies came to head with the apparent victory of a "superior" educational system that emphasized science and mathematics to a greater degree than the U.S. system of education.

There is also what may be called the "shame factor". If another country can produce students fluent in three languages or an infant mortality rate of x%, national pride is harmed by the inability of the actor's state to do so. This argument is mirrored in the political debate after the *Sputnik* surprise, when national leaders such as NASA Administrator T. Keith Glennan described being second in space as shameful.[40] Dwight Eisenhower's support for federal aid to improve US highways was generated in large part to his separate first-hand observations of the German *autobahn* system in the Second World War compared to inferior U.S. highways he had seen on a government survey in the 1910s.[41]

Projecting an Image

Domestic action may be a way for a state to project an image of itself into the international environment. The projection of a chosen image can show other actors the capabilities or potential of a state. Projecting an image of accomplishment implies that impressive action in one area signifies a general capability to accomplish great deeds. This image projection of national capabilities through a highly visible accomplishment is essentially a demonstration of what a state and its people *can* do; it is a demonstration of a "nation's power and vitality."[42] Proving leadership in science, technology, sports, or culture can all be elements of a carefully crafted national image projected into the international environment.

A good example is the image building done through the U.S. space program. The public spectacle of space missions, the planting of the American Flag on the Moon, and the recurring theme of national greatness, have all been

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[40] van Dyke 1964..
[41] Weingroff 1996, 5.
[42] Eugene B. Skolnikoff, *Science, Technology and American Foreign Policy* (Cambridge (Massachusetts): MIT Press, 1967).

part of political image building by NASA and political leaders.[43] The Apollo program was born to prove U.S. national capabilities and to restore confidence in U.S. technology. Subsequent projects, the Space Shuttle, and the Cold War years of the Space Station Project, continued this association of national power and the civilian space program. While domestic projects, the Shuttle and Space Station are depicted as national symbols of power, designed to declare the capabilities of the United States at home and abroad.

Space and Politics

Space Policy: Previous Studies

The existing literature on space policy covers a large number of topics and time periods. The adventure of space, along with technical and scientific accomplishments, has been well covered by this existing literature. The political dimension of space has also received a good deal of treatment but generally from the perspective of American politics or history. There has been limited discussion of space from an IR perspective, with the major exceptions of international legal studies and some discussion of international cooperation.

Space policy has been examined by a variety of different disciplines. In history, Walter McDougall (1985) in *The Heavens and the Earth*, documents the debate within the U.S. over the size, nature, and purpose of the space

[43] For an extensive discussion of the image of space as constructed by NASA and government leaders see Mark Byrnes, *Politics and Space: Image Making by NASA* (Westport (Connecticut): Praeger, 1994).

program. McDougall effectively places the Apollo program in the overlapping contexts of the Cold War and in the domestic political struggle of big verses small government. Other synthesis accounts have retold the history of the US space program, often highlighting the many key personalities that shaped the exploration.[44] Howard McCurdy's (1997) historical treatment, *Space and the American Imagination*, approaches the history of the US space program from a social angle, examining the *idea* of space in American culture and how conceptions of space have co-evolved with American social, political, and foreign policy concerns.[45]

Autobiographical accounts of space missions are quite common. The Apollo program, the benchmark for the entire space program, is the source of many memoirs. For this study, autobiographical accounts are important in highlighting other space projects. Hans Mark (1987) provides a semi-biographical account of the Space Station. Eric Chaisson's (1994) account of the stormy Hubble Space Telescope project provides inside details of that project.[46]

One significant genre of historical research deserves special mention. Official NASA histories provide in depth accounts of the evolution of particular

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[44] W. Henry Lambright, *Powering Apollo: James E. Webb of NASA* (Baltimore: Johns Hopkins University Press, 1995).
[45] Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985); William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998); Howard McCurdy, *Space and the American Imagination,* Smithsonian History of Aviation, ed. Von Hardesty (Washington (DC): Smithsonian Institution, 1997).
[46] Eric Chaisson, *The Hubble Wars* (New York: Harper Collins, 1994).

projects and the role of key administrators. These histories range from the very general accounts to highly detailed discussions of technological and managerial development.[47] While to some degree, NASA program histories are official declarations of success, they are also detailed accounts of the process by which decisions about technology are made, how science and engineering are balanced, and how politics shape the evolution of hardware. For example, Lord's (1987) account of the *Spacelab* project provides the minutia of international negotiations, while Levine (1982) maps out the evolution of NASA's managerial structure during the Apollo era. More recently, Heppenheimer's (1999) comprehensive account of the history of the Space Shuttle program details the bureaucratic negotiations and technological developments behind the US space program of the late 1960s and early 1970s.

Public policy analyses of space policy examine the processes of decision-making and coalition building necessary to carry out space projects.[48] John Logsdon (1989) has examined the recent history of NASA and the sense of drift that has dodged the US space program in the post-Apollo era.[49] Several recent studies have analyzed NASA as a cultural-organization milieu. Howard McCurdy (1994) describes NASA as an organization struggling in a largely

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[47] Roger Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990* (Washington: NASA, 1989); Arnold Levine, *Managing NASA in the Apollo Era* (Washington: NASA, 1982); Douglas Lord, *Spacelab: An International Success Story* (Washington: NASA, 1987).
[48] Lambright 1995; Logsdon 1970.
[49] John Logsdon, "A Sustainable Rationale For Manned Space Flight," *Space Policy* (February 1989).

unsympathetic government to find direction and a mission.[50] Diane Vaughan's (1996) massive study of the Space Shuttle *Challenger* accident takes a sociological approach, pointing to the organizational culture that made the accident possible.[51] W.D. Kay's (1995) account of NASA in the 1990s also takes an organizational approach, examining the complexities, technical and political issues that face the civil space program.[52] Joan Johnson-Freese and Roger Handberg (1998) critique contemporary US space policy for its difficulty in moving beyond the "Cold War space paradigm," and its failure to "reinvent space" as a policy area.[53]

Other studies and collections have examined space policy from a wider perspective, examining the problems and potential of the civil space program.[54] Roger Launius and Howard McCurdy (1997) provide several studies of presidential leadership in space that focus on the uneven influence presidents from Eisenhower to Clinton have had over space policy.[55] Goldman's (1992) *Space Policy* casts a wider net, discussing policy-making in the US and other countries, as well as examining the international dimensions of space.[56]

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[50] Howard McCurdy, *Inside NASA* (Baltimore: Johns Hopkins University Press, 1994).
[51] Diane Vaughan, *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA* (Chicago: University of Chicago Press, 1996).
[52] W.D. Kay, *Can Democracies Fly in Space? The Challenges of Revitalizing the US Space Program* (Westport (Connecticut): Praeger, 1995).
[53] Joan Johnson-Freese and Roger Handberg, *Space, The Dormant Frontier: Changing the Paradigm for the 21st Century* (Westport (Connecticut): Praeger, 1998), 7, 171.
[54] Radford Byerly, ed, *Space Policy Reconsidered* (Boulder (Colorado): Westview, 1989); Radford Byerly, ed., *Space Policy Alternatives* (Boulder (Colorado): Westview, 1992); Kay 1995.
[55] Launius and McCurdy 1997; James A. Vedda, "Evolution of Executive Branch Space Policy Making," *Space Policy* (August 1996): 177-92.
[56] Nathan C. Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992).

Discourse-based analyses of space policy are offered in several works.[57] Krug (1991) focuses on presidential discourse on space in the form of speeches and official statements. She identifies a distinct style of rhetoric for each President and ties that rhetoric to successful and failed policies and to attempts to guide the space program onto a desired course. However, there is not always a clear connection between discourse and actual policy. Byrnes (1994) looks exclusively at NASA generated material but includes a wider range of sources: government publications, public statements, and public relations materials. These works, often produced by anonymous authors, present an exhaustive catalog of images and metaphors used by the space agency since its birth in 1957 and which are still mined by space advocates today.

The literature that directly addresses the policy and politics of space stations is in contrast, sparse. Gary Westfahl (1996) has produced an exhaustive account of the many different presentations of space stations in science fiction literature, but does not directly address many of the political issues confronting the actual Space Station Project.[58] Hans Mark, who was Deputy Administrator of NASA as the Space Station decision was being formulated, provides a biographical account of the project's beginning. Mark's book is valuable, especially in revealing the intra-governmental negotiations

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[57] Byrnes 1994; Linda Krug, *Presidential Perspectives on Space Exploration: Guiding Metaphors From Eisenhower to Bush* (Westport (Connecticut): Praeger, 1991).
[58] Gary Westfahl, *Islands in the Sky: The Space Station Theme in Science Fiction Literature* (San Bernardino (California): Borgo Press, 1996).

and planning prior to 1984. However, his discussion of the SSP is limited to a few chapters and a few years worth of time (mainly 1983-4).[59] Howard McCurdy's (1990) account of the bureaucratic decision-making that lead to the Space Station project is also concentrated in time as it focuses on the period leading up to 1984.[60] International policy issues related to the SSP have received less coverage, with the important exception of two short works by Logsdon.[61] Articles that are included in Simpson (1984) are promotional in nature and the book itself (published by the Institute of Electrical and Electronics Engineers) is largely uncritical of the space station concept and program.[62]

International Politics and Space

The disciplinary link that this study is making, that between space policy and foreign policy, has been alluded to in most accounts of the US space program and in studies of other space programs. However, despite an almost universal acceptance that foreign policy has been a major (if not the single) influence on the US space program, there have been very few attempts to analyze systematically this assumption. In general, international relations

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[59] Hans Mark, *The Space Station: A Personal Journey* (Durham (North Carolina): Duke University Press, 1987).
[60] Howard McCurdy, *The Space Station Decision: Incremental Politics and Technological Change* (Baltimore: Johns Hopkins University Press, 1990).
[61] John Logsdon, "International Cooperation in the Space Station Programme,".*Space Policy* (February 1991); John Logsdon, *Together in Orbit: The Origins of International Cooperation in Space Station Freedom,* Monograph in Aerospace History #11 (Washington D.C.: NASA History Division, 1991).

scholars have not systematically examined policies related to space. It is true that certain aspects of space have been noted as international issues, including discussions of international cooperation and space as a "global commons."

Major analyses that do exist are from the earlier period in the history of space flight. Vernon van Dyke (1964) had the foreign policy dimension of the Apollo program as the theme, if not the entire subject, of his discussion of space politics. Van Dyke puts Apollo in the context of the Cold War and attempts to discuss national pride as a motive for the space program.[63] John Logsdon elaborates on this initial analysis with *The Decision to Go the Moon* (1970). Logsdon clearly links the Apollo decision to Kennedy's domestic position after the Bay of Pigs fiasco and his desire to be seen as beating the Soviets in a high prestige activity.[64] Both of these accounts were published concurrent with the Apollo program itself.

The practice of international cooperation in space has been the subject of several accounts, many of which are distinctly personal in time and scope. One useful account is Roger Bonnet and Vittorio Manno's history of the European Space Agency (ESA).[65] Both authors were officials of ESA and present a good overview of the political and economic factors that challenged the development of a European space program. A general history of

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[62] Theodore R. Simpson, ed., *The Space Station: An Idea Whose Time Has Come* (New York: Institute of Electrical and Electronics Engineers, Inc., 1984).
[63] van Dyke 1964.
[64] Logsdon 1970.
[65] Roger Bonnet and Vittorio Manno, *International Cooperation in Space: The Example of the European Space Agency* (Cambridge (Massachusetts): Cambridge University Press, 1994).

cooperation in space during the 1950s and 1960s is offered by Fruitkin, a participant in the International Geophysical Year talks.[66] Kenneth Pedersen, another participant turned analyst provides a good discussion of the key policy and political issues of the Cold War to post-Cold War transition. This account effectively places space policy at the nexus of foreign and domestic politics, with the emphasis on the dependence of the domestic program on the foreign policy interest.[67] However, this, and most other recent accounts tend to view international cooperation in space from a US policy perspective and not in an analytical fashion.[68]

Conclusion

This chapter has focused primarily on the literature of foreign policy and space policy. The goal has been to stress that foreign policy is an incomplete term in contemporary international relations. Foreign policy is ill defined by the IR literature, as it has a greater number of dimensions than previously understood. There is a greater overlap between foreign policy and domestic policy. There is no sharply demarcated boundary layer between these policy areas but rather an ill-defined frontier zone where policy acts cannot be tied to

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[66] Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs (New Jersey): Prentice-Hall, 1965).
[67] Kenneth Pedersen, "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," *Space Policy* (August 1992): 205-20.
[68] Herman Pollack, "International Relations in Space: A US View," *Space Policy* (February 1988): 24-30;
Ray Williamson, "International Cooperation and Competition in Civilian Space Activities," *Space Policy* (1985): 409-14.

a single side. It is important for a fuller understanding of politics, that foreign and domestic policy-making be bridged.

A second goal of this Chapter has been to bring forth the foreign policy dimensions of space policy in the United States. The existing literature has highlighted the political dimensions of the US space program but has tended to focus on primarily domestic political issues, bypassing the international side of the program or taking for granted that space budgets were supported by "foreign policy concerns." In fact, space is a good example of an "inter-mestic" issue area, sharing elements of both international and domestic politics. The inter-mestic qualities of the US space program requires an explicit analysis to fully understand the way in which space is explored and exploited by the United States. The Space Station Project, the largest project ever carried out in space, provides a valuable test case of the inter-mestic nature of the US space program. Using this case, we shall map the foreign/domestic policy-making matrix and domestic policy-makers use of foreign policy concepts and language.

This chapter has placed foreign policy in a different context and has briefly reviewed the literature of space policy. The connection between these fields is important but poorly understood. Foreign policy and international politics have always been important elements of space policy in the United States and in other countries. When projects compete or cooperate with other countries, foreign policy and space policy intersect, in both positive and negative ways. The factor common to both policy areas is a preoccupation with power. The theory and practice of foreign policy are dominated by quests for power and influence over the human world. Space exploration in a fundamental sense is a search for power from and over the natural world. It is the factor of power (and the knowledge that contributes to power) that links these two policy domains together and makes pursuits like the SSP an issue of both science and foreign policy. As knowledge power is central to the political justification of the SSP, it is important to understand how science and technology are perceived in modern society and the role that they play in the formulation of national policy. For that reason we shall now turn to a brief discussion of science and technology as political phenomena.

CHAPTER THREE

PERSPECTIVES ON SCIENCE AND TECHNOLOGY: POWER AND PERIL

> Knowledge and human power are synonymous.
>
> Francis Bacon, *Novum Organum*

> Learn from me... how dangerous is the acquirement of knowledge and how much happier that man is who believes his native town to be the world, than he who aspires to become greater than his nature will allow.
>
> Mary Wollstonecraft Shelley, *Frankenstein*

The Nature of Science and Technology

Knowledge is awe-inspiring in both the modern and archaic senses of the term. Modern people can appreciate Francis Bacon's praise of science as force for good as easily as Mary Shelley's warning about "going too far" in the search for knowledge. Science and technology (S&T), the embodiments of knowledge, can be a source of great power and great peril. Society both desires and fears new knowledge, as it is increasingly clear that S&T often produce as many problems as they solve. Because of this contradiction, S&T pose many dilemmas for the policy-maker and policy analyst.

NASA, not surprisingly, has reflected the Baconian tradition of "knowledge is power" in its public activities. The Space Station Project has been presented as one the highest pinnacles of human achievement. It represents both the generation and the use of scientific knowledge. The political justification of the SSP is based in large part on the assumption that scientific knowledge produces power in other realms of human existence: social, economic, and political. This assumption is basic to the SSP as a policy and as a political phenomenon. To fully appreciate the SSP, it is necessary to better understand the political power of this assumption. Therefore we must first address some of the issues surrounding science and technology and some of the dilemmas posed by them.

One such dilemma is the meaning of the terms, "science" and "technology."[1] There is often a lack of understanding over what these terms mean and their exact nature. Although they are linked with each other in the public discourse (especially in the public record to be discussed herein), this is often due to confusion about their nature and relationship to each other. Science and technology actually refer to different sorts of knowledge. At the most basic, science may be defined as research into the natural world that does not necessarily have a practical (military, social or market-place) objective. Scientists may explore a set of "puzzles" about the natural world without any explicit practical objective beyond intellectual pleasure. Astronomy and paleontology are two such sciences. Other paths of research may have a practical aim (improved weather or earthquake forecasting) without a specific

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[1] The section which follows is derived in part from Karl Leib, "Facing the Technology Gap: European Cooperation in Science and Technology," *Maxwell Review* (Spring 1997): 24-32.

commercial product in mind. Therefore, science may have a practical aim, but it is not essential that it have such an aim.

Because scientific research often has unknown commercial value, governments often provide more direct funding to basic science than do private firms. Science is also distinguished from technology in that science has historically been a more cooperative venture. Science and its practitioners have often transcended national or institutional boundaries in pursuit of knowledge. The nature of the scientific community means that scientific information moves very rapidly through networks of scientists exchanging results of experiments and research.[2] Scientists have often been ahead of their governments in promoting international cooperation; the formation of the European advanced physics research program and the European space science program were due primarily to the efforts of scientists such as Edoardo Amaldi and Niels Bohr.[3] Therefore, for the purposes of this study, science is defined as research into the natural world without necessarily a practical objective or product as its primary goal.

In contrast, technology is the practical application of scientific knowledge. Whereas science is most closely associated with research,

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[2] Alvin W. Trivelpiece, Director of the Oak Ridge National Laboratory, commented that with many scientific developments, the key piece of information was that something was possible and had been done (US Congress, House of Representatives, Committee on Science, Space, and Technology, Subcommittee on International Scientific Cooperation, *International Science and Technology and Foreign Policy* (Washington: Government Printing Office, 1990).

technology is linked to engineering, which is the actual construction of hardware.[4] Technology may follow from scientific research (as in the case of nuclear energy) or may precede knowledge of the scientific principles that make it possible (as in the case of many chemical processes). As a practical endeavor, technology development is an activity with a specific purpose or product as its final goal. Because technology development involves artifact creation, it is inevitably a commercial enterprise to a degree that science rarely reaches. In addition, the term technology is often taken to include the *management* of technology development, including all aspects of production and organization.[5] Technology also refers to specific artifacts or a system of artifacts used for practical ends. Technological artifacts overlay and reinforce each other to create integrated, if not always efficient, systems. With these factors in mind, this study shall define technology in two ways: 1) the application of knowledge or experience for practical ends, to carry out a specific task, or to solve a specific problem; 2) an artifact or system of artifacts that fulfills these purposes.

It should also be noted that many of the great accomplishments in S&T do not spontaneously arise in isolation from lonely laboratories. S&T are best

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[3] Christopher Layton, *European Advanced Technology: A Programme for Integration* (London: George Allen and Unwin Ltd, 1969).
[4] Eugene B. Skolnikoff, *The Elusive Transformation: Science, Technology and the Evolution of International Politics* (Princeton (New Jersey): Princeton University Press, 1993).
[5] Stanley Woods, *Western Europe: Technology and the Future* (London: Croom Helm, 1987).

seen as occurring in a *process*.[6] There are definable stages of scientific and technological development. Briefly, they can be identified as: 1) Basic research into physical phenomena based on theoretical assumptions or observations that need to be explained; 2) Applied research, i.e., application of basic knowledge in the pre-product stage; 3) Product development; 4) Product marketing, sale, and use.[7] Each of these stages represents a point between the investigation of a basic scientific question and the application of knowledge derived from that research.

S&T development itself is multifaceted and requires both time and money to support. Calls for greater spending or support for S&T often in practice mean attempts to stimulate the entire process of development. In addition, "technological development is cumulative in nature, because much derives from learning by doing."[8] To achieve a high level of technology is therefore a long-term and costly endeavor. Technological strength is also not a plateau that a state or firm achieves after a one-time effort;[9] it is a continuous process of relative gains and losses. Another key factor that should be identified is the perception that S&T, and the knowledge they produce, are

[6] Eugene B. Skolnikoff, *Science, Technology and American Foreign Policy* (Cambridge (Massachusetts): MIT Press, 1967).
[7] It should be noted that technology may also fall out of use, be suppressed, or abandoned. The end of the Apollo program may be regarded as an example of technological abandonment, where a conscious decision is made to cease reproduction and operation of a technological system.
[8] Margret Sharp and Keith Pavitt, "Technology Policy in the 1990's: Old Trends and New Realities," *Journal of Common Market Studies* 31 (1993): 129-51.
[9] Woods 1987.

sources of power. This power may flow to individuals, groups, or states. Knowledge increases an actor's ability to act, and will improve their ability to compete with rivals.[10] New developments in S&T do not always translate into political power, for many examples of counterproductive "advancements" could be cited. Nonetheless, the assumption that knowledge creates power remains. Technological solutions to problems and needs remain among the most politically popular.

An important, if poorly understood dimension to technological development is the concept of "spin-off." This is the idea that technological developments in a given field, for example material for aerodynamics, can be applied to another field. This transfer of materials, technique or hardware can be direct or indirect. In cases of direct transfer, an item developed in one field is applied to another, modified for use elsewhere, or applied to improve an existing technique. A stimulated spin-off is where an existing product or material is made more economical through a new, unanticipated use. A widely cited example is teflon, used and improved for use in the Apollo program, then employed widely in the commercial sector. The idea of spin-offs spreading out from a major technology development resembles ripples in a pond, helping to improve technology and the national economy. Spin-offs are common

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[10] History gives many examples of shifts in political power being driven in part by technological imbalances. European imperialism was made possible by a variety of economic, organization, and cultural developments but the technologies of transportation and war were a vital component.

justifications for government spending on S&T, whether from military applications (the global positioning system) or civilian projects (NASA life support technology adapted for medicine or fire fighting).

Because states and firms are often in competition for real and relative gains in technology, an important theme in the literature on technological development is the need for innovation. Innovation is defined as the development of new, more efficient uses for existing technology or techniques. This is done by improving an existing technology, or through new product development. Because no company or government wants to produce obsolete goods or services, innovation is needed to stay at the "cutting edge" of technology. Although cutting edge has also been applied in a somewhat faddish manner to high prestige and highly visible technologies, cutting edge technologies are usually defined as the most advanced technologies available.[11]

Competing Views of Science and Technology

The literature on the relationship between S&T and society is vast. A great deal of this literature discusses the proper relationship between a society and the science and technology that society creates. Because they influence interpersonal and inter-group relations in their many forms, S&T cannot be

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[11] Woods 1987.

regarded as politically irrelevant or politically neutral. Technology cannot be socially neutral when it changes how societies are structured, what skills are valued, and creates (or reinforces) the distribution of power and wealth. Technological developments (whether or not they are consciously directed) can either elevate or exclude members of a society. These developments may not be negative or "immoral," but are socially significant. The morality of science and technology are more difficult to define, as this depends on their use and the values used to interpret their morality.

Some political philosophers have viewed technology as a predominately negative "force" that distorts society and politics. In the early twentieth century, a leading figure in the sociological study of S&T, Lewis Mumford, took an ambivalent view of the impact of technology on society. He cautioned against viewing technology as neutral tools and warned that "The Machine" also shapes the user.[12] This sentiment was echoed by Jacques Ellul, who viewed modern communication and information technologies as totalitarian in nature and a threat to democracy by increasing the power of the state over individuals' lives, a view contrary to that held by many today with the advent of the Internet.[13] More recently, engineer Richard Sclove has argued that technology is not politically neutral but can have profound political implications for

[12] Lewis Mumford, *Technics and Civilization* (New York: Harcourt, Brace and Co., 1934).
[13] Jacques Ellul, *The Technological Society* (New York: Alfred A. Knopf, 1964).

individuals and communities.[14] The creation, management and use of S&T therefore has the potential to change the nature of socio-economic relations and the political structures which surround, support, and reproduce those relations.[15]

The notion presented by political theorists of S&T as "forces" of change does not necessarily imply technological determinism, the belief that technology determines the course of history. There may be logic to specific paths of scientific and technological evolution, as one technological development leads to subsequent developments and may close out certain options. This development is not predetermined or destined; many cases of technological "dead-ends" or "premature" developments attest to this. The invention of the car made dispersed suburban communities possible; it did not by itself create that social change, which was a product of several, independent trends.

Social changes produced by S&T may not only have political consequences but may also have a political origin. Developments in S&T are not random events from outside society, but are often the product of political decision-making. John F. Kennedy's decision to go to the Moon was largely political in nature and motivation and not an example of S&T driving events. Although technology made the Apollo program possible, it was politics that

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[14] Richard E. Sclove, *Democracy and Technology* (New York: Guilford Press, 1995). Sclove relays an account of how the introduction of running water and electric washing machines eroded traditional social interaction in a small village in Spain (Sclove 1995, 3).

ultimately begot the technology, and not the technology that forced Kennedy to act.

The relationship between S&T and government emerged slowly, driven by wartime demands for advanced weapons. In peacetime, government has become the means by which research with an uncertain economic pay-off could be pursued.[16] Government policy for S&T is a process itself, comprising policies to promote, deploy, and occasional "arrest" scientific and technological change.[17] Therefore, government may alternatively be responsible for initiating, managing, or restricting S&T.

Science, Technology and International Relations

International relations theory has not thoroughly examined the issues of science and technology. Theorists have not examined how decision-makers perceive and apply S&T for the fulfillment of national goals. Decision-makers must frequently make policy decisions that apply scientific and technological means to problems. The development of policies for science and technology also have not been studied extensively by theorists of international relations or foreign policy decision-making, despite a general understanding of the importance of these fields by scholars and practitioners alike.

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[15] Because many technologies that a society uses are imported (or even imposed) from the outside, technology may also embody certain cultural norms that are not universal in nature.
[16] Daniel S. Greenberg, *The Politics of Pure Science* (New York: New American Library, 1967).

The role of political decision-making for and about S&T extends to policies on the international level as well. Although specific scientific/technological artifacts or processes are viewed as relevant to international politics, traditional analyses of foreign policy-making have not thoroughly integrated the complexities produced by modern S&T, with the exception of new weapons and trade goods. There is a tendency to see S&T as "static givens, or as emanating from impenetrable black boxes," the contents of which were unknown.[18] The introduction of nuclear weapons produced a dramatic realization of the importance of science to military and political affairs. International relations scholars in the decades following the Second World War routinely cited science and technology as militarily vital. It was recognized that the traditional pursuit of foreign policy had been altered due to faster communications and travel. Technological change was expected to continue to occur, perhaps with radical new applications. However, the essential nature of international politics was expected to remain unchanged.[19]

International relations scholars have recognized the importance of S&T in one domain of international politics, national security. Security studies recognized S&T to be important since 1945, especially focusing on weapons-related technologies. The introduction of nuclear weapons produced a dramatic

[17] W. Henry Lambright, *Governing Science and Technology*, Public Administration and Democracy, ed. Dwight Waldo (New York: Oxford University Press, 1976).
[18] Skolnikoff 1993.
[19] Skolnikoff 1993, 7.

realization of the importance of science to military and political affairs. International relations scholars in the decades following the Second World War routinely cited science and technology as militarily vital.[20] Modern science (especially physics) had created new and devastating weapons that could alter the balance of power among states.[21] The policy conclusion was that because S&T are so vital for national power, national policies should seek to maximize the benefits of S&T and to maintain the strategic balance in those fields, especially in those technologies and sciences deemed "strategic" (such as atomic energy, computers, aviation, rocketry).[22] This growing awareness of S&T was significant, but the emphasis remained restricted to the security impact of technology. New technologies had altered the balance of power but the essential nature of international politics, fairly constant competition between states, remained unchanged; only tools of power had been introduced.

A second area of traditional international politics in which the affect of S&T was apparent to post-war scholars was in the decreasing relevance of time and distance. Traditional diplomacy and foreign policy-making had been

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[20] B.K. Blout, "Science as a Factor in International Relations," *International Affairs* 33 (1957): 71-8;
William T.R. Fox, "Science, Technology and International Politics," *International Studies Quarterly* 12 (1968): 1-15; Warner R. Schilling, "Science, Technology and Foreign Policy," *Journal of International Affairs* 13 (1959): 7-18.
[21] Hans Morganthau, *Politics Among Nations: The Struggle for Power and Peace,* 2nd ed. (New York: Alfred Knopf, 1954).
[22] Victor Basuik, "Technology, Western Europe's Alternative Futures, and American Policy," *Orbis* (Summer 1971): 485-506.

complicated due to faster communications and travel;[23] local crises rapidly became global issues and information, individuals and capital flowed more easily across borders due to improved and cheaper technology. As information technology developed and spread, state control over the means of disseminating information was dramatically eroded.

Because of the "CNN Effect" in foreign policy, governments find themselves reacting to events due to media coverage. The presence of mass media has made most diplomacy public. Traditional diplomacy also declined in the face of media technology. Communications between governments do not need to follow traditional diplomatic pathways; messages are direct between leaders, or indirect through mass media. In the Gulf War both sides communicated to each other through public announcements made in the media; it was faster than traditional diplomatic channels. The growing popularity of the Internet, and the increasing importance of information and communications technologies have improved the range of technology available to public and private actors. Militarily significant technologies, such as global positioning technology, are available commercially.[24] The existence of instantaneous communications has had the effect of accelerating inter-state relations and globalizing local crises to a degree that has not happened before.

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[23] Ralph Sanders, *International Dynamics of Technology,* Contributions in Political Science, ed. Bernard K. Johnpoll, Vol 87 (Westport (Connecticut): Greenwood Press, 1983).
[24] Irving Lachow, "The GPS Dilemma: Balancing Military Risks and Economic Benefits," *International Security* (Summer 1995): 126-48.

These changes have not been adequately addressed in the literature of either the neo-realist or neo-liberal traditions.

Science and technology also became signposts demarcating the potential of a nation-state. S&T, in this context, were perceived as demonstrating the capabilities of a state and its position vis-à-vis other great powers.[25] This is partially practical, as the ability to act in one sphere may mean the ability to act similarly in others. It may also be symbolic, demonstrating a state's overall ability or "greatness." The desire to promote the more intangible elements of national power, reputation and national pride, are visible in several recent state policy actions. The nuclear weapons and missile testing programs of India and Pakistan, were a "tit-for-tat" process of mutual demonstration, with each side proving their suspected ability to deploy nuclear weapons. The space programs of Britain, France, China, and India also have strong symbolic dimensions, proclaiming the great power status of each state. The various European technology initiatives of the 1980s, and most tellingly, the so-called "space race" between the United States and the Soviet Union, involved practical technological issues relating to security and trade; they also embodied national pride and became symbols of the power and ability of each superpower.[26]

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[25] Skolnikoff 1993.
[26] Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).

A final area where S&T have been discussed by IR scholars is economic competition. Later in the post-war period came a realization that economics was dependent on developments in S&T. Neo-liberal writers began to emphasize the importance of economics for political and military power. Advanced capitalist societies were more strongly oriented towards economic issues and economic competition. S&T were identified as sources of economic growth.[27] Increased global competition inspired calls for the government-funded stimulation of civilian technologies in much the same way that military-related technology had previously been supported.[28] There were calls for greater linkages between government and private industry to develop high technology.[29] Although these analyses included S&T, the focus was on the broad effects of scientific and technological change and not on specific policies that deal directly with S&T. In addition, just as during the early post-war period, security concerns drove many to call for a national S&T policy.[30] The importance of international trade and globalization intensified private sector

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[27] Robert Gilpin, *The Political Economy of International Relations*, (Princeton: Princeton University Press, 1987).

[28] W. Michael Blumenthal, "The World Economy and Technological Change," *Foreign Affairs* 66:3 (1987): 529-50. Neo-liberal scholars have also noted the increased importance of trade and communication in world affairs. While both of these trends have been facilitated by technology, an analysis based on this fact was rarely made.

[29] Daniel Burton, "High-Tech Competitiveness," *Foreign Policy* 92 (Fall 1993): 117-32; B. R. Inman and Daniel Burton, "Technology and Competitiveness," *Foreign Affairs* 69:2 (Spring 1990): 116-34.

[30] It should be recognized that technology is not a state monopoly and has proven to be fairly "footloose". Multi-national corporations are the primary source of technological developments. The complex and cross-border nature of the international trade in technological artifacts creates new problems of technology transfer and intellectual rights protection.

requirements for S&T development. Increasing, governments and corporations cooperate to stimulate the basic research necessary to keep up with cutting edge technological development. Just as during the early post-war period, security concerns drove national S&T policies, in the 1970s and 1980s increased global competition inspired similar calls for civilian technology.[31]

International Cooperation in Science and Technology

There is an additional dimension to the international politics of S&T that has not been fully examined by IR scholars. International cooperation to jointly develop and manage the products of research is not very often examined and very often disregarded as unimportant. International cooperation itself has been more often studied as an anomaly; the goal has been to explain why cooperation occurs against a background of conflict.[32] However, cooperation for the development or a new technology or for basic scientific research represents a different dynamic than most international interactions.

Cases of S&T cooperation, such as various Western European cooperative ventures, represent collaboration between states that defies traditional national/international classification.[33] Most models of international

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[31] Blumenthal 1987.
[32] Robert Axelrod, "The Emergence of Cooperation Among Egoists," *American Political Science Review* 75 (1981): 306-18; Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984).
[33] Roger Bonnet and Vittorio Manno, *International Cooperation in Space: The Example of the European Space Agency* (Cambridge (Massachusetts): Cambridge University Press, 1994);

politics tend to bifurcate government activities, relegating science and technology to domestic sphere. Interest is focused on the "high" political domains of military security and political economy. This is an artificial division, for scientific and technological research often transcends national borders. Specific programs of international cooperation for S&T represent a complex intersection of domestic and international activity. This intersection embodies certain aspects of traditional IR theory, primarily the notion of power, but also has characteristics (such as close government/corporate partnership and collaboration with economic competitors) that defy any attempts at pigeon-holing. On the surface, a policy area such as space would appear to be an issue of science rather than politics; however political and economic issues are present in abundance, especially when projects are international in scale. If a project or program is in the public eye (as many civilian space programs in the US and other democracies are), they may be explicitly tied to national (or as in the case of Europe, regional) pride or prestige.

In earlier decades, the academic field did not tend to integrate science and technology into its theoretical understandings of international politics. Most attempts to address the role of S&T in IR tend to be reactive, focusing on the immediate effect of a particular technology on the relations between states.

Wayne Sandholtz, *High Tech Europe: The Politics of International Cooperation*, (Berkeley: University of California Press, 1992).

Technology is viewed as either a source of new problems or threats, or is seen as a means to resolve existing problems.

A few authors have attempted to integrate some issues of S&T into traditional understandings of international relations. First, technological developments are seen as adding tools (i.e. weapons) to the arsenals of states. This was most obvious in the development of nuclear weapons, but also in the role of information technology in the Gulf War. Second, S&T are regarded as arenas of peaceful state competition. The development of space technology is the best example of this. Many authors have noted the importance of space for national prestige and for political propaganda. Third, new technological developments may be seen as a threat to national sovereignty.[34] Finally, authors may provide a survey of new technologies and their importance for foreign policy or international politics.[35]

Some authors have attempted a more fundamental theoretical approach. Sanders (1983) outlines the influence of S&T on the evolution of diplomacy, national power and capabilities since 1945.[36] A second scholar who has made this attempt is Granger (1979).[37] He examined how governments attempt to regulate technology and the interdependencies produced by modern

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[34] Walter Wriston, "Technology and Sovereignty," *Foreign Affairs* (Winter 1988-89): 63-75.
[35] Eugene B. Skolnikoff, *The International Imperatives of Technology: Technological Development and the International Political System*, Institute of International Studies, University of California (Berkeley) Research Series, ed. Ernst Haas, vol 16 (Berkeley: University of California (Berkeley), 1972).
[36] Sanders 1983.

technology. A third author is Skolnikoff, who has examined the international politics of S&T as both a dimension of foreign policy-making, and as a challenge to governance, both domestically and internationally.[38] His 1993 book in particular examines the various domestic policies relating to S&T and the dynamic between domestic and international policy. Skolnikoff points out the importance of policy-making for S&T and argues that modern technology is gradually eroding the sovereignty of states, although Skolnikoff rejects the idea of a fundamental change in the essence of world politics.

IR has touched the edges of the intellectual potential offered by an analysis of S&T. Rather than mere tools that bring no qualitative change to international politics, S&T are political phenomena and political products. A complete picture of world politics must take full account, not only of the dynamic power changes produced by S&T, but also the new issues and opportunities that new science and new technologies bring. It must also look within the "black box" of the state and what policies are made to create or restrict S&T development.

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[37] John Granger, *Technology and International Relations* (San Francisco: W.H. Freeman, 1979).
[38] Skolnikoff 1967; Skolnikoff, 1972; Skolnikoff 1993.

CHAPTER FOUR

FOLLOWING THE FLAG: FOREIGN POLICY AND THE U.S. SPACE PROGRAM

For I dipt into the future, far as human eye could see.
Saw the vision of the world, and all the wonder that would be;
Saw the heavens fill with commerce, argosies of magic sails.

Alfred, Lord Tennyson, *Locksley Hall*

Control of space means control of the world.

Lyndon Johnson (1958)

Introduction

As a highly visible policy area, the US space program provides a valuable window into the nexus of foreign and domestic policy. The contemporary program, led by NASA, the Department of Defense (DoD), the Commerce Department, and several other federal agencies, embraces many large projects and activities. Space policy includes policy for commerce, defense, intelligence gathering, transportation, and the production and distribution of information. US government agencies, however, exist in an environment replete with major corporations, NGOs, and other governments. Government agencies act as the regulators of corporations, but also contract with them for hardware and technology. Some corporations provide the same services offered by government agencies. NGOs (public interest groups, universities, professional associations) attempt to influence government policy and shape the public perception of space. Foreign governments cooperate and compete with the US in commercial, military, and scientific arenas.

These other actors play a variety of roles in shaping and influencing US space policy (civil, military, and commercial): contractor, regulator, partner, rival, and client.[1] This environment is important for its contribution to actual policy and also for the development of a complex discourse that transcends government actors and interfaces with the broader American culture. This discourse embodies beliefs about the power of S&T, the importance of space to foreign policy and domestic society, as well as a great deal of imagination.[2]

The history of the American civil space program has already been expertly chronicled, therefore, there is no need to recount the story in any detail.[3] However, certain events require close examination in order to better understand its political (foreign and domestic) and ideological dimensions. To understand how a seemingly domestic program has become so inter-twined

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[1] This study defines these three sections of space policy as follows: civil space are those projects managed by civilian government agencies (such as NASA, the Department of Commerce, National Oceanographic and Atmospheric Administration); military space refers to those activities carried out for defense or intelligence purposes and managed mostly by DoD and intelligence community; commercial space refers to all activities carried out primarily by private corporations (for example, satellite communications and some launching services).

[2] Howard McCurdy, *Space and the American Imagination*, Smithsonian History of Aviation, ed. Von Hardesty (Washington (DC): Smithsonian Institution, 1997), 2.

[3] Roger Bilstein, *Orders of Magnitude: A History of the NACA and NASA, 1915-1990* (Washington: NASA, 1989); Roger Launius, *NASA: A History of the US Civil Space Program* (Malabar (Florida): Kreiger, 1994);
Walter McDougall, *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985); William E.

with foreign policy and perceptions of national power, it is necessary to examine the historical roots of that policy. The historical record provides strong evidence that foreign policy considerations have long shaped space policy in the United States, provided many of its most important justifications, and influenced the selection of its missions. At the same time, the specific foreign policy dimensions of space policy have evolved over time as US interests and national concerns have changed. The early space age was characterized by Cold War competition, directed at the Soviet Union. As time has passed and more actors have entered space, US policy concerns have expanded to include commerce, arms control, and the management of international space projects.

Although the history of space exploration and utilization is complex, it can be demarcated or divided into several different, overlapping periods. For the purposes of this study, the history of the US space program shall be divided into three phases of development. The first period shall be referred to as the "space race." This was concurrent with the high Cold War period of the 1950s and 1960s when tensions were high and superpower competition was at its height. The USSR won positive press by achieving many "firsts" in space. Nineteen fifty-seven witnessed the Soviet launch of first satellite (*Sputnik 1*) and first living thing in space (the dog Laika) aboard *Sputnik 2*. Subsequent Soviet space missions successfully launched the first man (Yuri Gagarin) and the first woman (Valentina Tereshkova) into space.[4] These years saw the most direct association of space policy with the national interest as the US sought to "catch-up" to and surpass the Soviet Union in such space spectaculars. "From Sputnik forward, the heavens provided the USA and the USSR with a grand stage from which they sought to make bold statements not only about their technological prowess but about their political and economic superiority as well."[5]

This period saw the creation of NASA, the earliest space flights, and the drama of the U.S.-Soviet marathon in space. The "race" to the moon between the US and the Soviet Union is a familiar story as much for the high drama of superpower competition than the final scientific achievement. The roots of contemporary space policy discourse and perceptions of space also have their roots in this era.

The second period corresponds to the temporary easing and eventual revival of the Cold War in the 1970s and early 1980s. During this period there was also a widespread perception that American power had declined. At the same time, the Apollo program wound down and space policy-making entered a period of transition where practical space utilization replaced international

[4] Gagarin's flight on *Vostok 1* was 12 April 1961; Tereshkova's flight on *Vostok 6* was 16-19 June 1963.
[5] Kenneth S. Pedersen, "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," *Space Policy* (1992): 206.

competition as the stated goal of the program.[6] Space utilization and applications refer to the use of space for some practical purpose such as meteorology, navigation, remote sensing, communication or manufacturing. Utilization of the space environment was not new in the 1970s, but became more widespread and more publicly visible. To date, all but manufacturing have become major industries generating billions of dollars in economic activity.[7] Although competition with the Soviet Union remained a common theme in the political discourse of space, expenditures were increasingly justified on more practical grounds.[8] Space projects were promoted as producing science and health innovations, as a means to monitor the environment, as long-term economic investments, and for their value in stimulating scientific and technological development. This was seen in the *Skylab* space station project and the Space Shuttle, both developed during the 1970s.

The third period, beginning in the 1980s, has witnessed an increasing stress on commercialization of space and on space applications. Practical space utilization and development remain important ideas in this most recent period but a greater emphasis has been placed on the private commercial

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[6] Mark E. Byrnes, *Politics and Space: Image Making by NASA* (Westport (Connecticut): Praeger, 1994).
[7] See John L. McLucas, *Space Commerce* (Cambridge (Massachusetts): Harvard University Press, 1991) for a discussion of the existing and potential commercial uses of space.
[8] Byrnes 1994.

development of space.[9] The privatization of certain space activities that began in the 1980s has decreased the government role in satellite launching, vehicle development, and remote sensing.[10]

Concurrently, in government projects, a greater emphasis has been placed on international cooperation to distribute costs and risk. The emphasis on technology development has remained important, however. In the Space Station Program (SSP), scientific discovery and technological advancement have been placed within the context of cooperation with other states.

Throughout the entire "space age" (1957 to the present) there have been several common features that would later prove very important for the development of the SSP. The first was the stated belief that the space technology infrastructure was a national "asset" or "resource." This can be interpreted as political or economic value, but also as a military conceptualization. The Shuttle in particular was identified as a national military asset because of its ability to launch and retrieve defense satellites.

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[9] Exploration shall be defined as the scientific investigation of space or objects in space, either by space probes or piloted spacecraft. Utilization shall be defined as the use of the space environment for a practical (economic or military) purpose.

[10] The main American expendable launch vehicles are marketed by their manufacturers (*Delta* by Boeing, *Atlas* and *Titan* by Lockheed Martin, and *Pegasus* and *Taurus* by Orbital Sciences Corporation). Today NASA has little direct role in the commercial launch market. NASA was ordered to reduce and later to cease commercial launch contracts for the Shuttle after the *Challenger* accident (Craig Couvault, "Reagan Authorizes Orbiter to Replace Challenger," *Aviation Week and Space Technology*, (18 August 1986), 18-9); White House, "Presidential Directive on National Space Policy, Fact Sheet," Washington: NASA Historical Collection, 1988.

The second common feature of the space policy discourse is the stated linkage between the US space program and American leadership and power. It is a commonly stated objective of the US space program to demonstrate American power. The development of new industries and technology spin-offs have traditional been identified as significant sources of economic power. The leadership concept was also driven by the competitive needs of the Cold War and the belief that space accomplishments would produce psychological benefits in the form of national pride at home and prestige internationally. National prestige would be generated by the accomplishment of difficult or complex deeds that were "impressive to mankind."[11] During the Cold War, the target audiences for such messages was multiple, including the Soviet Union, US allies, and most importantly, the "undecided" Third World states wavering between East and West. National prestige may be seen as an adjunct of power and a means to enhance a state's reputation, as was seen in the post-*Sputnik* period.[12] In the post-Cold War era, the intended international audience is less clear but space activities are still linked to national prestige. More definite has

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[11] John F. Kennedy, "Special Message to Congress on Urgent National Needs," in *Public Papers of the Presidents of the United States: John F. Kennedy. 1961* (Washington: U.S. Government and Printing Office, 1962), 396-406. A memo from Lyndon Johnson to John Kennedy in 1961 urged haste in the US space program before "the margin of control over space and *over men's minds* through space accomplishments will have swung so far the Russian side that we will not be able to catch up" Lyndon B. Johnson, "Memorandum For The President, April 28, 1961," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. I: Organizing For Exploration*, ed. John Logsdon (Washington: NASA, 1961), 427-9.

been the intended domestic audience for space activities. Success in space is seen as generating national pride and inspiring youth to study science and to create a national sense of progress.

Phase One: Competition and Cold War

Space flight first entered the American political landscape after the Second World War.[13] Captured German rocket technology, combined with decades of research by rocket enthusiasts, revealed that space flight was a real possibility rather than Saturday matinee fantasy. However, the public was not yet convinced of the potential of this technology, as a 1949 Gallup Poll revealed. While large percentages believed in the likelihood of atomic-powered trains and a cure for cancer within fifty years, only 15% believed that piloted rockets would reach the Moon in the same time period.[14] Many in government were also initially dubious about the potential of space technology.[15]

Over time, the potential value of satellites became increasingly clear. Plans to develop and launch an experimental satellite proceeded apace in the 1950s, though the military potential of rockets was more readily accepted than the idea of human space flight. In the scientific community, many practical uses

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[12] Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).
[13] McDougall 1985.
[14] George Gallup, ed., *The Gallup Poll: Public Opinion 1935-1971: Volume Two 1949-1958* (New York: Random House, 1972).

of space flight had been identified. However, during most of the 1950s, space was a matter for a small circle of scientists, engineers and political leaders where the military and *political* meaning of space gradually emerged.

"Man Will Conquer Space Soon"

The public became aware of the potential of space through articles published in the widely read *Colliers* magazine. Between 1952 and 1954 a series of articles written by Werner von Braun and other engineers and scientists appeared along with spectacular paintings by Chesley Bonestell.[16] They set forth a model of Solar System exploration that would form the basis of many subsequent plans and ambitions (as well as fictional accounts), and has become known as the "von Braun Paradigm."[17] The cover of the first issue promised that "Man Will Conquer Space *Soon*" and offered the plan of how it could be done.[18] The articles outlined the basic principles of astronautics, as well as the political, economic, and military benefits that would accrue from space exploration. The ultimate objective was defined as the exploration of the

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[15] Burrows, 1998.
[16] *Colliers* (22 March 1952, 18 October 1952, and 30 April 1954). Portions of these articles have been reprinted in John Logsdon and others ed., *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. I: Organizing For Exploration* (Washington: NASA, 1995). The articles were also reprinted in Cornelius Ryan, ed., *Across the Space Frontier* (New York: Viking, 1952), who was the editor of the original series.
[17] Dwayne Day, "Paradigm Lost," *Space Policy* (1995): p. 153-59. Elements of the same ideas were later incorporated in von Braun's 1969 *Space Frontier* (Wernher von Braun, *Space Frontier* (New York: Fawcett Publications, 1969)). Von Braun has been closely associated with the US space program and his vision has been adopted by many subsequent thinkers.

Moon and Mars, culminating in permanent bases, all supported by space stations and various space vehicles. The articles described the use of space stations for weather forecasting, intelligence gathering, and as orbital missile bases. The *Colliers* articles were an excellent exercise in propaganda but also a means to lend credibility to a new and difficult to understand field. These articles served two purposes: they were a means of educating the public and a method of generating support for the designers' dreams. The plans were elaborate; in fact they were overly ambitious, as later developments would show. Von Braun and company also apparently assumed that the drive into space would be an American enterprise. Although most of the public did not concern themselves with these matters, faith in American know-how and technology was firmly planted in the public mind. However, space was about to enter the public consciousness in a big, and unsettling, way.

The Sputnik Surprise

The assumption of American scientific leadership was severely shaken in 1957. The US space program (run by the military services) was a fairly quiet activity that had been overshadowed by more visible advances in aviation and nuclear power. The issue of space entered the broader political arena through the unexpected, and at the time terrifying, Soviet launch of *Sputnik 1*. This

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[18] The cover is reproduced in McCurdy (1997), 39.

event in October 1957 became the so-called "Pearl Harbor of the Cold War."[19] Subsequent satellite launches proved that the Soviets had serious capabilities in this area. Because the Soviets had beaten the US into space, American claims of leadership in science and technology were apparently undermined.

Although the Eisenhower Administration tried to project calm and reassure the public, the "*Sputnik* surprise" jolted the US public with fears of being behind in key technologies.[20] According to historian Walter McDougall, the "public outcry... was ear-splitting."[21] This outcry was driven by concerns about the potential of Soviet technology, what it meant for the Cold War, and even a sense of shame of being bested by a presumably backward society permeated the popular press and elite political discourse.[22] Demands for action

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[19] Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958* (Westport (Connecticut): Greenwood Press, 1981).
[20] Linda Krug, *Presidential Perspectives on Space Exploration: Guiding Metaphors From Eisenhower to Bush* (Westport (Connecticut): Praeger, 1991).
[21] McDougall 1985.
[22] Clowse 1981; David Callahan and Fred Greenstein, "The Reluctant Racer: Eisenhower and US Space Policy," in *Spaceflight and the Myth Presidential Leadership*, ed. Roger Launius and Howard McCurdy (Urbana (Illinois): University of Illinois Press, 1997), 15-50; Robert Dallek, "Johnson, Project Apollo, and the Politics of the Space Program," in Launius and McCurdy 1997, 68-91; McDougall 1985. The debate over space policy in the late 1950s was also a part of a wider partisan political struggle in the United States (Arnold Levine, *Managing NASA in the Apollo Era* (Washington: NASA, 1982), 12). The assigning of "blame" over the *Sputnik* humiliation was also a highly partisan process (Rip Bulkeley, *The Sputniks Crisis and Early United States Space History: A Critique of the Historiography of Space* (Basingstoke (England): Macmillan, 1991)).

lead to the creation, 11 months after *Sputnik*, of a new agency designed to spearhead the US drive into space.[23]

The National Aeronautics and Space Administration (NASA), created out of the earlier National Advisory Committee on Aeronautics (NACA), took the lead in civilian space activities. NASA's brief was extensive, embracing the aviation research function of the NACA, space science, and the nascent human space flight program. The 1958 NASA Act also divided military and civilian space, entrusting the public civilian program with NASA and the military space program with the Defense Department.[24] However, over the next few years, NASA absorbed several military space projects, including von Braun's Huntsville, Alabama installation and the Jet propulsion laboratory in California. The Huntsville facility (and von Braun's team) was transferred over stringent Army objections.[25] As a civilian agency, and as a counter to the secrecy of the Soviet space program, NASA was directed to seek out international cooperation when appropriate.[26] NASA's programs were carried out in public

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[23] The creation of National Aeronautics and Space Administration out of the existing National Advisory Committee on Aeronautics was proposed in April 1958 by President Eisenhower and passed into law in October 1958.
[24] Space has a variety of military/security uses: communications, navigation, meteorology, treaty-monitoring, and intelligence gathering. The Strategic Defense Initiative or "Star Wars" ballistic missile defense research project has also been significant.
[25] Bilstein 1989. The demarcation between military and civilian space projects was fluid at best; a great deal of civilian space hardware is derived from military equipment and many astronauts have been former and current members of the military services.
[26] "National Aeronautics and Space Act of 1958" (Unamended). NASA History Office [Web Page], Accessed 3 July 1998. http://www.hq.nasa.gov/office/pao/History/spaceact.html.

and launches were major events. This meant that NASA's failures, as well as successes, were under intense public and media scrutiny.

Eisenhower's primary focus was the military importance of space technology and the potential scientific discoveries that could be made.[27] However, the psychological significance of space was not overlooked. National Security Council papers NSC 5520 and NSC 5814 clearly show awareness by the Eisenhower Administration of the political importance of space, although military and scientific considerations were the primary focus. In 1955, NSC 5520 prophetically noted that in addition to scientific and military applications, "Considerable prestige and psychological benefits will accrue to the nation which first is successful in launching a satellite." The paper warned that "The inference of such a demonstration of advanced technology might have important repercussions on the political determination of free world countries to resist Communist threats..." if the USSR were first to launch a satellite.[28]

NSC 5814, issued after the launch of *Sputnik 1*, warned that Soviet military potential would be enhanced by unchallenged entry into space. This document further noted that because *Sputnik* had "captured the imagination and admiration of the world," it would negatively affect the image of the US in "the neutral and uncommitted countries." NSC 5814 warned that the Soviets

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[27] John Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge (Massachusetts): MIT Press, 1970).

could use its space superiority "as a means of undermining the prestige and leadership of the United States." It was important to use the emerging space program to promote a positive image of America as a peaceful, powerful leader.[29] At about the same time, a Presidential Advisory Committee report on space identified national prestige as a major motive alone for states to explore space.[30] Clearly, the political implications of space were well understood by the Eisenhower Administration.

Despite this awareness, Eisenhower himself tried to avoid a costly political program with limited scientific or military value. Eisenhower's underlying fiscal conservatism demanded avoidance of a costly space race; the linkage between space and national power was downplayed.[31] However, this was a failed effort, for this linkage was intensified by the visible failure of American rockets and Soviet success in launching large satellites. US space policy was in need of a firm direction and in desperate need of a success.

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[28] National Security Council, "Draft Statement of Policy on US Scientific Satellite Program (NSC 5520)," [20 May, 1955] in Logsdon, *Exploring the Unknown, Vol. I*, 308-13.
[29] National Security Council, "US Policy on Outer Space (NSC 5814)," [20 June 1958] in Logsdon, *Exploring the Unknown, Vol. I*, 345-59.
[30] President's Science Advisory Committee, "Introduction to Outer Space," [26 March 1958] in Logsdon, *Exploring the Unknown, Vol. I*, 332-4.
[31] van Dyke, Vernon. *Pride and Power: The Rationale of the Space Program*. Urbana (Illinois): University of Illinois Press, 1964.

John F. Kennedy and the "Giant Leap for Mankind"

John F. Kennedy clearly shifted the debate over space policy into the realm of foreign policy and national power. Kennedy had campaigned against the Eisenhower record on defense, citing an alleged "missile gap" and warning of Soviet advances in space. Under the Kennedy Administration, space became more explicitly linked to the national interest, foreign policy, and America's future. The "New Frontier" metaphor, which dominated Kennedy's presidential campaign, was easily incorporated into the space frontier: "Space is our great New Frontier," according to Kennedy.[32] What emerged from the next few years was an openly declared "space race" in which the US was the under-dog challenger in a high stakes contest.[33] The goal was explicitly political and premised on the need to demonstrate US power and capabilities. It was also, according to Richard Beschloss, politically expedient and played on public fear of the Soviets.[34] Scholars have noted the correlation between the space race's most dramatic act, the race to land on the Moon and a specific foreign policy failure. Political scientist John Logsdon and historian Michael Beschloss have each linked Apollo to the politically damaging failure at the Bay of Pigs in

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[32] This comes from a campaign statement written for Kennedy during the presidential campaign and appearing in the trade journal *Missiles and Rockets* (Logsdon 1970, 65-6).
[33] Byrnes 1994.
[34] Michael Beschloss, "Kennedy and the Decision to Go to Moon," in *Spaceflight and the Myth Presidential Leadership*, ed. Roger Launius and Howard McCurdy (Urbana (Illinois): University of Illinois Press, 1997), 51-67.

April 1961.[35] The Cuba debacle, along with the flight of Yuri Gagarin in *Vostok 1* the same month, immediately preceded Kennedy's initiation of the Lunar goal and produced the need to prove American capabilities. Kennedy queried Vice President Johnson (as head of the Space Council), "Is there any other space program which dramatic results in which we could win [against the Soviets]?"[36]

"Beating the Russians" became the mantra of the American civilian space program. Human space flight programs, Mercury, Gemini, and Apollo, were designed with the goal of matching and surpassing Soviet accomplishments. The U.S. also "raced" the Soviets in prestige-laden (as well as scientifically important) Lunar and planetary probes, and took the lead in communication satellites.[37] Kennedy stressed that achieving these difficult objectives demonstrated America's capability to friend and foe alike. Kennedy argued that a Lunar landing was both feasible and "impressive to mankind."[38] The same logic is apparent in Kennedy's remarks at Rice University in 1962:

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[35] Logsdon 1970; Beschloss 1997.
[36] John F. Kennedy, "Memorandum For Vice President, April 20 1961," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. I: Organizing For Exploration*, ed. John Logsdon (Washington: NASA, 1961), 424.
[37] Michael Kinsley, *Outerspace and Inner Sanctums* (New York: Wily, 1976).
[38] John F. Kennedy, "Special Message to Congress on Urgent National Needs," in *Public Papers of the Presidents of the United States: John F. Kennedy. 1961* (Washington: U.S. Government and Printing Office, 1962), 396-406.

"We choose to go to the Moon in this decade, and do the other things, *not because they are easy but because they are hard.*"[39]

The Apollo program became a major government undertaking, involving hundreds of thousands of people across the country and billions of dollars. After years of hard work and the tragic deaths of several astronauts, America "won" this round of the space race. The flight of *Apollo 11* achieved Kennedy's goal and became the ultimate symbol of the space age. On 20 July 1969, the Lunar Module *Eagle* landed in *Mare Tranquillitatis* and two Americans walked on the surface of the Moon. Although public interest rapidly faded, six additional Apollo missions flew to the Moon between 1969-1972, and a total of 12 Americans explored its surface. The Soviet Union, after a series of accidents and technical problems quietly abandoned its Lunar program, pleasantly denying for years that it had ever intended to send cosmonauts on such a voyage.[40] After *Apollo 11*, NASA went in search of new mission even as cheers echoed across the country. Despite the cheers, the US was about to embark on a new stage of its exploration of space that was antithesis of the Apollo model.

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[39] John F. Kennedy, "Address at Rice University in Houston on the Nation's Space Effort," in *Public Papers of the Presidents of the United States: John F. Kennedy. 1962* (Washington: U.S. Government and Printing Office, 1963), 668-71.
[40] James Oberg, *Red Star in Orbit* (New York: Random House, 1981). Public information emerged in the late 1980s regarding the details and fate of the Soviet Lunar program.

Phase Two: Transition and the Search For a Mission

Post-Apollo

By July 1969, other issues had taken priority over space, despite Apollo's success. The Soviets had been beaten and had apparently dropped out of the race. Nonetheless, NASA continued to play the Soviet card in seeking budgetary support. In reporting to Congress of the need for continued support for NASA, Werner von Braun warned of "another surprise of the Sputnik category" if the US wavered in its push into space.[41] The image of the Soviet "threat" in space continued to be used in subsequent decades as NASA officials defended space budgets. Competition with the Soviets remained the *sine qua non* of the US civilian space program throughout the 1960s and into the 1980s, even as funding and support for the program wavered.

When the newly elected Administration of Richard Nixon assumed office in 1969 it began a major review of the US space program. The final result was the Space Task Group proposal, developed by a committee chaired by Vice President Spiro Agnew. The Agnew plan set forth a grand vision reminiscent of the *Colliers* articles and the von Braun paradigm. It included a permanent space station, a fully reusable space shuttle system, a Lunar base, and a human mission to Mars. The plan was projected to have an annual cost of

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[41] US Congress, House of Representatives, Committee on Science and Astronautics, *1971 NASA Authorization* (Washington: US Government Printing Office, 1970).

between $5 billion for the most gradual sequence, to $10 billion for the most rapid project development.[42]

However, growing concern about domestic problems, public apathy about space, and most importantly, a lack of political support, made this grand vision untenable. President Nixon rejected a mission to Mars or any other large project on the model of Apollo.[43] Nixon was not interested in a costly new space initiative, although he seemingly enjoyed the spectacle of the Apollo missions carried out during his Administration. He did seek a greater emphasis on practical space utilization projects and international cooperation.[44] However, Nixon regarded human space flight to be important and did not want to end the program.[45] He therefore approved a scaled down shuttle system and a limited space station program, the Apollo Applications Project, later known as *Skylab* (to be discussed in the next chapter).

Nixon also approved a project that briefly made space a theater for cooperation. The Apollo-Soyuz Test Project (July 1975) was the first joint mission in space between the superpowers. In this mission, the last *Apollo*

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[42] Gregg Maryniak and Richard Boudreault, "Resources of Free Space vs. Flags and Footprints on Mars," *Space Policy* Vol. 12 Number 2 (1996): 103-17. Heppenheimer notes that the Task Group expected the moderate version of the plan to be accepted by Nixon (T.A. Heppenheimer, *The Space Shuttle Decision: NASA's Search For A Reusable Space Vehicle* (Washington: NASA History Office, 1999), 149.

[43] T.A. Heppenheimer, *The Space Shuttle Decision: NASA's Search For A Reusable Space Vehicle* (Washington: NASA History Office, 1999), 150.

[44] Joan Hoff, "The Presidency, Congress, and the Deceleration of the U.S. Space Program in the 1970s," in Launius and McCurdy 1997, 92- 132.

spacecraft docked with a Soviet *Soyuz* and the crews met and exchanged greetings.[46] Arising out of an idea by Nixon's Secretary of State Henry Kissinger, Apollo-Soyuz represented a brief symbolic easing of the Cold War, but was a technical and political dead end.[47] The next half-decade saw human space flight become a Soviet monopoly.

The Winged Spaceship

With the rejection of the full post-Apollo initiative, the Space Shuttle became the primary project NASA would pursue in the 1970s. The Space Shuttle was simultaneously a failure and success, representing at different times both the glory and the nadir of the US space program. The development of the Shuttle produced a long gap in the American human space flight record. No Americans flew in space between Apollo-Soyuz in July 1975 and the first Space Shuttle flight in April 1981. This was the longest such hiatus since Alan Shepard's 1961 flight. However, the Shuttle was a remarkable vehicle. With a reusable orbiter and booster rockets, and an expendable external fuel tank, it remains the most complex spacecraft every constructed. The Shuttle also had

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[45] George Low, "Memorandum For The Record. Meeting With the President on January 5, 1972," (Washington: NASA Historical Collection, 1972), 1.
[46] Low 1972, 2; Nathan Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992); See David Portree, *Thirty Years Together: A Chronology of US-Soviet Space Cooperation* (Houston: NASA Johnson Space Center, Management Services Division, 1993) for a detailed chronology of US-Soviet cooperation in space.

a long, difficult development phase that consumed the US space program for a decade. The story of the Shuttle in many ways is prescient of the Space Station experience a decade later.

The Shuttle was a political compromise between NASA and the executive branch (primarily the OMB).[48] The budgetary restrictions imposed from above encouraged NASA oversell the Shuttle's cost effectiveness ana capabilities. NASA, searching for allies, enlisted the Department of Defense to help win approval and funding from the Administration. In exchange, the military required design changes and reserved numerous Shuttle missions for military cargo.[49] Therefore, the Space Shuttle, in contrast to previous civilian space projects, was *explicitly* tied to national security as a "national asset."[50]

However, the system that emerged from the budget and design negotiations of the early 1970s was significantly different from the fully reusable

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[47] Although the US and the Soviet Union did jointly develop a docking module to allow the *Apollo* and *Soyuz* to link up, the 1975 mission was the last Apollo flight and the unit was never used again.
[48] The story of the Shuttle and the negotiations between NASA, OMB, and the Nixon White House are detailed in Heppenheimer 1999.
[49] The Pentagon insisted on a larger cargo bay to accommodate military and reconnaissance satellites. The Shuttle's wings took on their current delta-wing shape to give the Shuttle greater maneuverability in case of an aborted launch (Heppenheimer 1999, 401). James Beggs credited then Air Force Undersecretary Hans Mark (later Beggs' Deputy at NASA) with securing Pentagon support for the Shuttle during the late 1970s (James Beggs, Interview With Author, 22 July 1999).
[50] US policy gave priority to "national security missions" Ronald Reagan, "Fact Sheet Outlining United States Space Policy," in *Public Papers of the Presidents of the United States: Ronald Reagan, 1982, Book II, July 3 to December 31, 1982* (Washington: US Government Printing Office, 1983), 896.

system originally conceived.[51] As the only surviving part of the post-Apollo program the Shuttle lacked a clearly defined purpose. In the absence of a space station or other large mission, the Shuttle became an "orbital truck," to launch commercial satellites. NASA secured a controversial policy that called for the eventual replacement of the country's expendable launch vehicle (ELV) fleet by the Shuttle, although the Air Force maintained an small supply of ELVs for some of its payloads. The Shuttle did ensure the continuation of the astronaut program and produced a string of new techniques not attempted before, such as orbital construction and the repair of orbiting satellites. But a fatal flaw of the Shuttle program was the lack of a critical mission for the vehicle fleet to perform.

The over-ambitious claims made for the Shuttle resulted in a disappointing spiral of mission loss, with numerous mission objectives never achieved. The promised reduction in launch costs per pound of payload never materialized. This was because estimates had been based on a launch rate that was unrealistic due to the complexity of the system and the demands of crew safety. The number of projected flights per year dropped considerably after the start of the program. Initial claims that the Shuttle would fly 30-50 times a year proved wildly optimistic. By the late 1970s NASA was predicting about 25 flights a year, but even this number was impossible to achieve. The greatest number of Shuttle flights in a single year was 9 in 1985. On average, between 1981 and 2000, there have been 5 Shuttle flights a year.[52] The complexity of Shuttle technology proved to be the program's nemesis. Launch delays for technical difficulties were not uncommon. The Shuttle simply could not deploy satellites frequently or reliably enough to be cost-effective compared to ELVs.

Beyond complexity, the Shuttle was not well suited as a launcher of commercial payloads for several other reasons. The Shuttle's payload capacity, though large, was not optimal, as it also carried a crew and all the hardware needed to keep them alive. Technical requirements for crew safety contributed to flight delays. Government payloads, primarily military ones, had the highest priority for launch. The end result was that the Shuttle manifest was over crowded and the launch scheduled slipped greatly over time.

While often troubled, for nearly five years the Shuttle symbolized a renewed US space program and promised new adventures and triumphs. Numerous payloads were deployed and new types of in-space work pioneered. The Shuttle quickly became the centerpiece of the NASA program. However this world was shattered by the greatest crisis in the history of the US space

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[51] The Shuttle NASA originally sought would have had two piloted, reusable stages. The first would boost the second towards orbit and then return to the launch site.

[52] The average number of flights per year prior to the *Challenger* accident (1981-1986) was 4.6. There were no flights from January 1986 to September 1988. The average number of flights per year for the years 1988-2000 was 5.8.

program. The entire country was shocked when Space Shuttle *Challenger* exploded 73 seconds after lift-off on the cold morning of 28 January 1986. The loss of the seven-member crew troubled the public and placed every NASA program in jeopardy.

The agency-wide convulsions of this period have been examined in many different ways, and the details are beyond the scope of this study.[53] However two effects need to be highlighted. The immediate result of the accident was the suspension of Shuttle flights. Several key scientific and military payloads were delayed while some commercial customers looked elsewhere for launch services. Space science projects such as the *Hubble* Space Telescope were mothballed.

The accident also brought a renewed sense of risk to space operations. There was anger that seven people had died attempting to launch a communications satellite. The result was that the Shuttle would loose one of its primary missions. In mid 1986, a Presidential order directed that the Shuttle be phased out of the commercial launch services market.[54] This policy was reaffirmed in a still-classified space policy directive, approved in 1988. The Shuttle was barred from launching almost any commercial or foreign payloads

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[53] For an exhaustive account of the *Challenger* accident, see Diane Vaughan, *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA* (Chicago: University of Chicago Press, 1996).
[54] Criag Couvault, "Reagan Authorizes Orbiter to Replace Challenger," *Aviation Week and Space Technology* (18 August 1986), 18-9.

(i.e. everything except US government payloads). As described in a non-classified summary of the policy, only commercial payloads that are "man-tended, [that] require the unique capabilities of the STS," or which serve US security or foreign policy interests could be flown on the Shuttle.[55] The policy effectively took the US government out of the commercial launch market, leaving the field open to private firms and foreign governments, but leaving the Shuttle without a clear function.

Returning to space in 1988, the Shuttle continues to be an important launch vehicle for government and scientific payloads. It remains the only American vehicle rated to carry humans into space and shall continue to serve that role exclusively for perhaps another decade, or more. In spite of setbacks, or perhaps because of them, the Space Shuttle remains a symbol of national pride and ability. It also has one critical mission yet to perform, the construction and servicing of the International Space Station.

Phase Three: Economic Competition and America's Future

Practical space activities are increasingly commercial rather than governmental. As the political dimension of space has faded, first after Apollo, and further in the aftermath of the Cold War, the emphasis on the economic benefits of space increased. This has been particularly important in the areas of

Earth observation and communication. The shift towards economic issues has challenged NASA as an institution, shaking its traditional strategy of defining "international leadership in largely and military terms."[56]

In response, economic arguments have become more visible as a means to promote the government space program. The importance of economic issues has generally increased over time as technology has evolved, but the emphasis was clearly shifting by the early 1980s. In a 1984 radio address, Reagan described encouragement of private industry as a key goal of US space policy, as important as the Space Station and international cooperation.[57] The Reagan Administration's original space policy placed a great stress on commercial development of space, and on occasion Administration officials hinted at the advantages of privatizing all or part of Space Shuttle operations.[58] Shuttle ground operations were eventually privatized and contracted to a corporate consortium known as the United Space Alliance.

In general terms, a major form of economic competition relating to space is the space services market. When the Shuttle was serving as the primary US launch vehicle, it soon became a major provider of commercial launch services.

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[55] White House, "Presidential Directive on National Space Policy, Fact Sheet," (Washington: NASA Historical Collection, 1988), 7.
[56] Kenneth S. Pedersen, "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," *Space Policy* (August 1992): 207.
[57] Ronald Reagan, "Radio Address to the Nation on the Space Program," in *Public Papers of the Presidents of the United States: Ronald Reagan, 1984, Book I, January 1 to June 29, 1984* (Washington: US Government Printing Office, 1986), pp. 108- 9.
[58] Reagan, "Fact Sheet Outlining United States Space Policy."

After the Shuttle was barred from the commercial launch market, the issue of private competition between US firms and foreign launch interests took the place of government-to-government competition. American allies and partners are also competitors, a fact that has been increasingly part of space policy discourse.[59] Despite the partial privatization of the US space industry, like many other large industries, commercial space activities have employed foreign policy arguments in lobbying the government to change regulations or obtain subsidies. In this sense, competition within the space services market resembles any other major economic sector.

The market is also globalized, as space service technologies have become more widespread. There are more national and corporate actors vying for market share. Today the American space service sector faces stiff competition from Europe, Russia, China, and Japan. On the horizon India, Brazil, and Ukraine loom as potential future competitors as the world witnesses "Growing Equalization of Competence" in space technology.[60] New firms and corporate-government alliances are emerging. This competition is still used as an argument to increase spending on aerospace research and development in order to preserve the competitiveness of U.S. technology. Earth

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[59] Pedersen 1992, 213.
[60] NASA Advisory Council, Task Force on International Relations in Space, *International Space Policy for the 1990's and Beyond* (Washington: US Government Printing Office, 1987). Arianespace, the European government/business consortium, is the major competitor of

observation/reconnaissance and communication satellite data are produced in a global market, putting additional pressures on US corporations, who in turn pressure the US government for bigger budgets for S&T development.

The second economic dimension that has been added to the space policy debate is the effect on the broader economy. Chapter 3 discussed the idea of technological stimulation spreading forth from a specific project into the broader economy like ripples in a pond. The notion of technological "spin-off" has been an important argument used to promote the space program, especially when defending budgets. Since the 1980s, the indirect economic and technological benefits of space activities have been increasingly linked to international economic concerns. Explicit economic arguments have been used to support the Shuttle, the Space Station, and in retroactive justifications of Apollo. The development of advanced technology is cited as reason enough to pursue civilian space ventures. Space expenditures are defended as vital for "the technological superiority of the Nation."[61]

The technological superiority argument is that high-tech sectors, such as computers, aviation, and electronics, *require* ambitious projects to maintain innovation and growth. Without ambitious projects (usually with some form of

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American firms, holding about half the world market for satellite launches with its *Ariane* series of rockets. India launched its first rocket with a commercial non-Indian payload in 1999.

[61] George Bush, "Remarks on the 20th Anniversary of the *Apollo 11* Moon Landing, July 20 1989," in *Public Papers of the Presidents of the United States: George Bush 1989. Book II, July 1 to December 31, 1989* (Washington: U.S. Government Printing Office, 1990), 990-3.

government sponsorship), economic growth and competitiveness will suffer. Space technology fits into a world-view that sees S&T as vital for American prosperity, job security, and global leadership.[62] Exploiting the commercial potential of space has replaced political competition with the (now defunct) Soviet Union as the primary goal of the space program. Economic development through technology is a growing theme of current NASA policy, most recently in the speeches and policies of Administrator Daniel Goldin. More explicitly than his predecessors, Goldin has stressed the value of space programs for the future of the country and has linked economic growth to a healthy investment in NASA.[63]

International Partnerships: Opportunities and Precedents

Parallel to policies designed to increase the commercial competitiveness of US space technology are a variety of cooperative arrangements. International partnerships in space are nothing new, as NASA is charged by its institutional charter to pursue cooperation.[64] Despite the space race, there is also a long tradition of cooperative behavior. The International Geophysical Year (1957-58) produced a wide range of cooperative arrangements for the

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[62] Howard McCurdy, *Inside NASA* (Baltimore: Johns Hopkins University Press, 1994).
[63] One example includes Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future, Remarks at the National Press Club" (NASA Historical Collection, 1994). Additional discussion of this topic appears in Chapter 6.
[64] "National Aeronautics and Space Act of 1958," Title I, Section 102c, Paragraph 4.

exchange of data.[65] Scientific exchanges between the US and the Soviet Union occurred even during the height of the Cold War.[66] John F. Kennedy made an apparently serious proposal for joint Lunar exploration in 1963.[67] There were many scientific exchanges during the 1960s and 1970s between the two superpowers. International space missions, including Apollo-Soyuz and flights by foreign astronauts on the Shuttle, were politically, economically, and scientifically valuable to NASA and its partners. Significantly, as the federal science budget tightened, international cooperation has become more important and vital for the survival of expensive projects like the Space Station.

Space science projects, such as the *Galileo* probe and the *Hubble* Space Telescope (HST) have had important international components.[68] The Space Shuttle was also partially internationalized, utilizing the Canadian-built Remote Manipulator Arm and the European *Spacelab* module. While these systems extended the Shuttle's capabilities, they were also politically useful, as the Nixon Administration had insisted on international participation to reduce

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[65] Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs (New Jersey): Prentice-Hall, 1965).
[66] Office of Technology Assessment, *US-Soviet Cooperation in Space: A Technical Memorandum.* (Washington: US Government Printing Office, 1985), 9.
[67] Eugene B. Skolnikoff, *Science, Technology and American Foreign Policy* (Cambridge (Massachusetts): MIT Press, 1967), 7.
[68] *Galileo*, a Jupiter science probe, was a cooperative project with the Federal Republic of Germany. The European Space Agency provided the solar panels and other hardware for the Earth-orbiting *Hubble*.

the costs of the Shuttle program.[69] Cooperation in space has also included valuable exchanges of information and the development of experiments flown on NASA spacecraft. These partnerships all provided precedents for international participation in the SSP. Despite these benefits, international partnerships have not always been entirely satisfactory, especially from the standpoint of the international partners, who were often at the mercy of American budgetary and managerial processes. Europe and Japan were clearly "junior partners" in the sense that the United States had the final word about the design, scheduling, and termination of projects. Two missions in particular, albeit successful, strained the relations between NASA and its first major partner in space, the European Space Agency. The *Spacelab* program represented a first attempt by ESA and NASA to jointly operate a human space flight element. A second project, the International Solar Polar Mission (ISPM) was a space science program severely downgraded by unilateral US actions. The experience of these joint projects created tension in the case of *Spacelab* and ill feeling in the case of the ISPM. These feelings carried over into the negotiations for the SSP. These projects also provide insight into the different levels of political action that shape international cooperation in space programs.

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[69] George Low, "Memorandum For The Record. Meeting With the President on January 5, 1972," (Washington: NASA Historical Collection, 1972), also see Richard Nixon, "Memorandum for Peter Flanigan From the President, November 24, 1969," in *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. II: External Relations,*

Because of these considerations, this study shall divert for brief discussions of *Spacelab* and the ISPM.

Cooperation Cases: NASA and ESA

Spacelab

The *Spacelab* program grew out of post-Apollo plans to develop a series of space stations.[70] When Nixon rejected NASA's large space station, a plan to develop a small modular orbiting lab evolved. The idea for a similar Shuttle-borne "sortie can" emerged in the early 1970s, based on a modular lab developed at Ames Research Center for use in a Convair 990 aircraft.[71] NASA and European space officials had also been searching for a possible European contribution to the Shuttle program. Two proposed European contributions, hardware for the Shuttle proper and an orbital transfer vehicle (or space-tug), had been rejected for fear that excessive technology transfer might occur. NASA was also reluctant to have any vital components of the Shuttle provided by a foreign source. A "sortie can" was an acceptable alternative as it would not be vital for Shuttle operations and would have fewer technology interfaces.[72]

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ed. John Logsdon (Washington: NASA, 1969), and Douglas R. Lord, *Spacelab: An International Success Story* (Washington: NASA, 1987).
[70] *Spacelab* should not be confused with the wholly American *Skylab* program.
[71] Lord 1987.
[72] National Academy of Science, 1998, p. 19-20.

The project, under the more dignified name of *Spacelab*, was formalized as Europe's contribution to the Shuttle program in 1973.

NASA, and the European Space Research Organization (ESRO),[73] a predecessor organization to ESA, signed a Memorandum of Understanding (MOU) for *Spacelab* on 14 August 1973.[74] The MOU set forth the parameters of the project and each party's responsibilities. Under Article 5.1, ESRO (later ESA) agreed to develop and build the *Spacelab* segments and transfer one unit free to NASA. The US agreed under Article 8.1 to purchase at least one additional unit and additional equipment. While the European countries would pay the development costs, NASA would own the *Spacelab* system and make all decisions regarding its use.[75]

The *Spacelab* facility was modular, with a large pressurized module fitting into the Shuttle cargo bay and accessible to the crew by an access tunnel. Unpressurized "pallets" could accommodate a variety of experimental equipment. American and European investigators conducted a wide variety of

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[73] The European Space Research Organization had been established in 1962 for space science and spacecraft development. A second organization, the European Launch Development Organization (ELDO) had been formed the same year to develop rockets. The failure of this latter program was one of the reasons ESRO and ELDO were merged into a single organization in 1975. Roger Bonnet and Vittorio Manno, *International Cooperation in Space: The Example of the European Space Agency* (Cambridge (Massachusetts): Cambridge University Press, 1994).
[74] *Memorandum of Understanding Between the National Aeronautics and Space Administration and the European Space Research Organization For a Cooperative Programme Concerning Development, Procurement and Use of a Space Laboratory in Conjunction With the Space Shuttle System*, In *Spacelab: An International Success Story*, ed. Douglas Lord (Washington: NASA Scientific and Technical Information Division, 1973), 437-59 [Hereafter NASA-ESRO MOU].
[75] NASA-ESRO MOU, Article 11.3a.

experiments during the 16 *Spacelab* flights, which flew between 1983 and 1998.[76]

Despite the successful experiments, *Spacelab* was a source of tension between NASA and ESA, primarily over control and use of the facility. NASA remained in a privileged position, although *Spacelab* did give European industry and government an opportunity to do serious work on human space flight.[77] All the major design changes made to the Shuttle in the early 1970s required changes to the *Spacelab*, increasing ESRO/ESA's costs.[78] Delays in the Shuttle program increased equipment and maintenance costs borne by European experimenters.[79] The total development cost of the project, US$1 billion, was borne by ESA alone, while NASA controlled the use of *Spacelab*. Many European officials were disappointed by the infrequency of *Spacelab* flights, especially as NASA struggled to make up for the post-*Challenger* gap in Shuttle flights. While an average of twelve *Spacelab* flights a year had been projected by an overly optimistic NASA in 1980, there had been a total of four

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[76] Kay Grinter and Paula Shawa, "Space Shuttle Mission Chronology" (John F. Kennedy Space Center [Web Page], Accessed 20 November 1998). http://www-pao.ksc.nasa.gov/kscpao/chron/chrontoc.htm.
[77] Former ESA Director General offered a more positive view, "ESA had to pay the price of Spacelab to acquire the basics of manned space flight" Reimar Lüst, "US/European Cooperation in Space: An Historical Perspective," *European Affairs* (Autumn 1989): 88.
[78] Lord 1987.
[79] *Aviation Week*, "U.S.-Europe Collaboration Variable," *Aviation Week and Space Technology* (1 September 1980), 275-77.

Spacelab flights by 1986.[80] European officials also had hoped NASA would buy several additional *Spacelab* units, thus lowering the production cost. However, NASA only purchased the one unit required by the MOU.

There was sense that ESA did not benefit from *Spacelab* as had been originally hoped.[81] In retrospect, many European officials viewed the MOU with NASA to have been a poor agreement that left ESA with little influence over the project once the hardware was delivered to NASA, a sentiment shared by some former American officials.[82] The sense that ESA had negotiated a poor agreement returned during the Space Station talks in 1984 when ESA officials insisted on firm access guarantees for the SSP[83]

The International Solar Polar Mission

In the late 1960s solar physicists sought to expand observations of the Sun's polar regions via space probes. The polar regions are difficult to observe from Earth and it was hoped to learn more about the complex solar environment. A major goal was to study the entire solar environment more

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[80] *Aviation Week*, "Spacelab, Solar-Polar Curtailed," *Aviation Week and Space Technology* (23 February 1981, 18-9).
[81] Ray A. Williamson, "International Cooperation and Competition in Civilian Space Activities," *Space Policy* (November 1985): 413.
[82] Jeffrey M. Lenorovitz, "ESA Pursuing Space Station Role," *Aviation Week and Space Technology* (5 December 1983), 16-7. One US official felt that the US had "let the allies down" in the *Spacelab* project. The budget had not been supported over time and overall, the US had not been "a good partner" (Confidential interview by author).

extensively than ever before and to study both poles of the Sun simultaneously. The ISPM project was started in 1979 as a joint US-European mission and formalized in a MOU signed that same year. The project was seen by ESA officials as a means to generate additional space experience and to extend their existing cooperative relationship with NASA. The plan was for two spacecraft, one American and one European.

The ISPM faced budgetary issues from the very beginning. Congressional budget cuts for Fiscal Year 1981 proposed in 1980 threatened first a launch delay, and later the cancellation of the American probe. This would have reduced the mission to a single probe and severely limited the range of data that could be collected. The changes to the US program raised concerns in Europe and led to letters of protest from ESA member governments to the State Department. The Carter Administration also lobbied Congress to restore the canceled funds, arguing that US credibility as a partner would be hurt and cooperative agreements in other areas would suffer. A joint US-West German project was specifically cited.[84] While funding was restored, the episode created unease among European space officials over the stability

[83] *Aviation Week*, "Europe Pushes Space Station Role," *Aviation Week and Space Technology* (18 June 1984), 16-7; *Aviation Week*, "Europeans Hesitate on U.S. Space Station Plan," *Aviation Week and Space Technology* (4 June 1984), 24.
[84] Alton Marsh, "Solar-Polar Fund Threat Spurs Worldwide Protest," *Aviation Week and Space Technology* (26 May 1980), 22.

of joint projects and reminded ESA of its vulnerability to unilateral American decisions.[85]

These fears were confirmed in 1981 when cuts to the NASA budget by the incoming Reagan Administration forced the final cancellation of the US probe.[86] The NASA budget was cut, as was all other non-defense discretionary spending. Because NASA, along with the White House and DoD, were focused primarily on the Space Shuttle, space science programs bore the brunt of the cuts. Once again, strong European protests were conducted through embassies in Washington but with no success in this instance.[87] ESA lobbied to have the program reinstated, at one point offering to sell NASA a cheaper spacecraft as a substitute.[88] Although the MOU between NASA and ESA had been conditional on the availability of financial resources, European space officials felt that the abrupt American cancellation had violated the spirit, if not the letter, of the agreement. The cancellation process had been particularly galling to ESA, as the decision was made unilaterally and with virtually no advanced notice to the Europeans.[89] Initially, the Europeans were also concerned about the launch, communication, and tracking of their spacecraft.

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[85] *Aviation Week*, "U.S.-Europe Collaboration Variable," *Aviation Week and Space Technology* (1 September 1980), 275-77.
[86] Joan Johnson-Freese, "Canceling the US Solar-Polar Spacecraft: Implications for International Cooperation in Space," *Space Policy* (February 1987): 27.
[87] *Aviation Week*, "ESA Seeks Solar-Polar Compromise," *Aviation Week and Space Technology* (30 March 1981), 20-1.
[88] *Aviation Week*, "ESA Seeks Solar-Polar Compromise," 20-1.
[89] Johnson-Freese 1987, 24-37.

The US had undertaken to provide these services to ESA regardless of the US probe's cancellation, but American guarantees were not highly regarded at this point[90] The ISPM cancellation would be legacy that the US would have to overcome when negotiating the Space Station agreements a few years later.[91]

Conclusion

The history of the US civil space program has been dominated by two key factors. The first is the shifting basis of its political justification. In the early Cold War, space activities were overtly political in nature with a strong sub-theme of military security. The power and security of the nation were directly linked to its ability to act successfully in space. Over time economic issues became more prevalent and the idea emerged that space was important for *economic* security. The second key factor is the persistence of foreign policy as the shadow of the space program. The public debates and discourse surrounding the space program reveal a pattern of argumentation that clearly links space to foreign policy issues, including alliance cohesion, national, prestige, and competitiveness. This linkage has been a double-edged sword when foreign policy concerns have shifted and public fears have changed. It

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[90] *Aviation Week*, "ESA Considers Options For Solar-Polar Mission," *Aviation Week and Space Technology* (28 September 1981), 26.
[91] The ESA probe was renamed *Ulysses* and launched on 6 October 1990 by Space Shuttle *Discovery*.

has often been difficult for NASA to adjust its strategy quickly enough to maintain political support.

The next chapter shall examine in depth the largest and most "international" of NASA's programs: the Space Station Project. The SSP grew out of the institutional/political milieu described in this chapter and shares many policy traits seen with the Space Shuttle. While the SSP is embedded in the history outlined above, it has experienced its own specific difficulties, namely questions about its value and purpose. The Space Station is also unique in that its declared "missions" (science, technology, and commercial development) have remained constant over time but have declined in number. The Station's political rationale, however, changed dramatically as the Cold War faded and Russia went from adversary to partner. These factors, along with the size of the program, make the SSP an ideal case in the study the locus of foreign and domestic politics in the US space program.

CHAPTER FIVE

THE EVOLUTION OF THE INTERNATIONAL SPACE STATION PROJECT

> Can it be possible that our passion for large cities, and large parties, and large theatres, and large churches, develops no faith nor hope nor love which would not find aliment and exercise in a little "world of our own"?
>
> Edward Everett Hale, "The Brick Moon" (1869)

> Scientists and engineers know how to build a station in Space that would circle the earth 1,075 miles up... If we do, we can not only preserve the peace but we can take a long step toward uniting mankind.
>
> Wernher von Braun, "Crossing the Last Frontier" (1952)

The Development of the Space Station Idea

"The Brick Moon"

The idea of a permanently occupied, orbiting space station dates back to the nineteenth century and has long been part of the dreams of space enthusiasts. The first description of a space station in either science or fiction was an 1869 novella by Edward Everett Hale entitled, "The Brick Moon," published in the *Atlantic Monthly*.[1] Although Hale's work was fiction, it did suggest that a space station could serve as a navigation aid for ships. While a

[1] The novella is reprinted in its entirety in John Logsdon and other, ed. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. I: Organizing For Exploration* (Washington: NASA, 1995), 23-55.

humble beginning, the "Brick Moon" has been the starting point for many authors as they recount the history of the space station idea.[2]

Variations on the space station theme soon appeared the writings of space flight pioneers.[3] The Russian Konstantin Tsiolkovsky saw space stations as the linchpin of his somewhat mystical vision of Humanity's future in space. Tsiolkovsky foresaw space stations evolving into idyllic orbital cities with large populations. The Transylvanian-German Hermann Oberth wrote of the practical uses of a space station in *The Rocket in Interplanetary Space* (1923). He considered orbiting stations to be useful for navigation and an excellent refueling point for the more important missions of reaching the Moon and Mars. In 1929 Austrian army officer Hermann Potocnik, writing under name Hermann Noordung, introduced what would become the classic space station image: the wheel in space.[4] In this and similar designs, the wheel would rotate to produce artificial gravity for its inhabitants.

[2] John Logsdon, "Space Stations: A Historical Perspective," in *Space Station: Policy, Planning, and Utilization: Proceedings of the AIAA/NASA Symposium on the Space Station*, ed. Mireille Gerard and Pamela Edwards (Washington: AIAA/NASA, 1983), 14-22.
Gary Westfahl, *Islands in the Sky: The Space Station Theme in Science Fiction Literature* (San Bernardino (California): Borgo Press, 1996). A good overview of the history of space station decision is in Sylvia Doughty Fries and Frederick I. Ordway III, "The Space Station: From Concept to Evolving Reality," *Interdisciplinary Science Reviews* 12 (1987): 143-59.
[3] Konstantin Tsiolkovsky, "Investigation of Universal Space by Reactive Devices," In *Works on Rocket Technology*, ed. M.K. Tikhonravov (Moscow: Publishing House of the Defense Industry, 1965; reprint, Washington: NASA Technical Translation, 1965), 111-217. See also, William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998); Logsdon, 1983.
[4] Fries and Ordway, 147; T.A. Heppenheimer, *The Space Shuttle Decision: NASA's Search For A Reusable Space Vehicle* (Washington: NASA History Office, 1999), 10.

The dreams of these early pioneers still resonate in the writing of space visionaries today. However, many of the functions suggested by early writers have come true in other ways. Figure 5.1 lists some of the missions proposed by early space station designers up to 1960. Many take advantage of the vacuum and weightless environment of space for research or commercial activities. However, space station designers did not anticipate the twentieth century's rapid advances in electronics and slower advances in rocket lift capability.[5] Many of the most profitable activities on this list occur today but not on space stations. Smaller, remote operated satellites, not multi-man space stations, perform the meteorology, navigation, and science functions in Figure 5.1. Therefore, the missions remaining for space stations focus on advancing human space flight: servicing other spacecraft, as a staging post for planetary exploration, a habitation for colonists, or a quarantine area for astronauts returning from the Moon or planets.[6]

[5] Visionary Arthur C. Clarke, who published the first proposal for communication satellites, expected that each satellite needed a crew, to replace "burned out vacuum tubes" (Quoted in William J. Walter, *Space Age* (New York: Random House, 1992), 234.

Figure 5.1. Proposed Space Station Uses (1869-1960)

RESEARCH	SECURITY
Astronomical Observation Chemistry/Material Testing Microgravity Physics Medicine and Biology Technology Proving Testing Long-Term Human Space Flight	Intelligence/Reconnaissance Gathering Nuclear Weapon Deployment
UTILIZATION	OTHER
Communication Relay Earth Resource Observation/Management Meteorology Navigation Aid	Assembly of Other Structures Colonization Staging Base for Lunar, Mars Exploration Quarantine Area

As Gary Westfahl (1996) points out in his analysis of space stations in fiction, it has been commonly assumed that space stations are a starting-off or transition point with the real action occurring elsewhere.[7] Questions about the true value of space stations has also occurred in reality: space stations are often not important as places in themselves, but as way-stations to somewhere else. Historically, space stations have been plagued by ambiguity of function and the recurring image of being stepping-stones or proving grounds for some other, more important objective, such as Lunar or Martian exploration. As American space engineers and policy-makers developed space station concepts, the puzzle of "what is it for?" has never been fully resolved.

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[6] The last function mentioned in US Congress, Select Committee on Astronautics and Space Exploration, *Space Handbook: Astronautics and Its Applications* (Washington: US Government Printing Office, 1959).
[7] Westfahl 1996, 145.

The "Wheel in Space"

In the post-war United States, space station design remained heavily influenced by European models. Wernher von Braun, working for the US Army in the 1950s, presented one such model in the *Colliers* magazine articles discussed in the previous chapter.[8] The cornerstone to his grand design was a permanently occupied space station, similar in design to Noordung's wheel. Such a station would be an outpost for scientific and military observation of the Earth and a base for Lunar exploration. The designs published in *Colliers* also had a significant impact on the perception of what a space station *ought* to look like. The graceful wheel in space has become *the* space station image, persistent in art, literature, and film, as well as engineering studies.[9]

In addition to science and exploration, von Braun suggested that a space station could be a platform for nuclear weapons. When some of the articles were reprinted in book form, Cornelius Ryan (*Colliers* reporter and editor of the series), commented ominously in the introduction, "Whoever is first to build a station in space can prevent any other nation from doing so."[10] From the beginning, space stations were described as giving power to their owners because of their scientific and economic value, and for what they could potentially do to the Earth.

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[8] Key articles from the *Colliers* series are reprinted in Logsdon, *Exploring the Unknown,* Vol. 1, 176-200.
[9] The public image of space stations as rotating wheels was solidified by the 1968 film *2001: A Space Odyssey*.
[10] Cornelius Ryan, ed. *Across the Space Frontier* (New York: Viking, 1952), xiii.

Reality however, did not follow the original von Braun script. The need to reach the Moon before the Soviets required that the US bi-pass the development of a space station in favor of a single direct flight from the Earth. In addition, space-based telecommunications and weather forecasting were being performed by much cheaper craft that did not require a human presence. Therefore, neither Lunar exploration or space utilization would employ space stations in the 1960s. Space station ideas were still discussed within NASA and the broader space community during the 1960s and after, but they remained only concepts, with no budgetary or political support.[11]

Post-Apollo and Skylab

Although NASA had requested a space station as part of its ambitious post-Apollo program, this item fell victim to budgetary limitations. However, after Apollo, the US would pursue a limited space station program derived from Apollo spacecraft and Saturn launch vehicles.[12] The Apollo-Applications Program, later named *Skylab*, was a large space station used by three separate three-man crews in 1973-4. The crews broke space flight endurance records and conducted numerous scientific experiments. The first crew even engaged in a vital space walk to repair damage *Skylab* sustained during

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[11] Interview With John Hodge, 4 June 1998. John Hodge served in several capacities including Director of the NASA Space Station Task Force and NASA Associate Administrator. See also, Philip Culbertson, "Current NASA Space Station Planning," *Astronautics and Aeronautics* (September 1982), 37-59; Nathan C. Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992);

launch. However, attention to the project was mild compared to Apollo. Left in orbit, *Skylab*, which had no refueling capability, fell from orbit in 1979, scattering debris in Australia. The fall of *Skylab* inadvertently symbolized the seemingly incapacitated American space program of the 1970s. The *Skylab II* facility was never used and literally became a museum exhibit. The primary difficulty for *Skylab*, as Heppenheimer has noted, was that it lacked "compelling character" and produced no dramatic advances in the manner of Apollo.[13]

However, for the future SSP, the *Skylab* project was important for several reasons. Two hundred and seventy research projects in diverse fields were conducted on *Skylab*.[14] The project proved the potential of research in space, especially the study of the effect of microgravity on living things.[15] This had value for piloted space flight by expanding understanding of the effects of long-duration space flight. For many researchers, however, it also hinted at the enormous potential for applied scientific, industrial, and medical research in microgravity. *Skylab* provided the base-line against which other long-duration space flights could be judged.[16] Because the first crew had conducted emergency repairs that saved the facility, *Skylab* also proved "how important man is to our activities in space," a jab at claims about the superiority of robotic

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[12] The *Skylab* itself was constructed out of a modified third stage of a Saturn V rocket.
[13] Heppenheimer 1999, 103.
[14] Leonard David, *Space Station Freedom: A Foothold on the Future* (Washington: NASA, 1988).
[15] John McLucas, *Space Commerce* (Cambridge (Massachusetts): Harvard University Press, 1991); Fries and Ordway 1987, 143-59.

spacecraft.[17] Finally, *Skylab* would later be rhetorically integrated into a sequence of projects starting with Mercury and culminating (at the present) with the SSP. *Skylab* would therefore serve as both a precedent for the SSP and as a link between that project and the now almost legendary Apollo era. On the negative side however, *Skylab* could be cited as a functioning space station, making a second American space station seem redundant.

In his post-Apollo decision, Richard Nixon offered NASA a "hobson's choice" of either a space station or shuttle.[18] NASA opted for the Shuttle with hopes that a station could be initiated later. According to an interpretation of history found in some NASA documents and publications, the aim in building the Shuttle was to build in increments the plan rejected by Nixon.[19] The Shuttle would reduce the cost of space flight and prove that routine access to space was possible. The next goal (not yet approved) was the construction of a permanent space station. Therefore, the space station idea remained very much alive at NASA, despite the lack of political support. As the Shuttle

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[16] Culbertson 1982, 37-59; Philip Culbertson, "Space Station: The Next Step in Space?" *Air and Space* (Spring 1983), 12-4. American space flight duration records set on *Skylab* would not be broken until the Shuttle-*Mir* program of the late 1990s.

[17] James Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society" (Washington: NASA Historical Collection, 1982), 4.

[18] Interview With James Beggs, 22 July 1999. James Beggs was NASA Administrator from 1981 to 1985. Beggs notes that Nixon realized that a space station would be proposed after the Shuttle was operational, but left that decision (and funding fight) to a latter president.

[19] The 1992 *Space Station Freedom Media Handbook* phrases the interpretation of history in the following manner: "Thus in 1972, in the approval a reusable space transportation system, the Space Station concept itself was approved. The transportation segment, called the Space Shuttle, would be developed first. The Space Station itself would await the future" NASA, *Space Station Freedom Media Handbook* (Washington: NASA, 1992), 4. The same passage is repeated in NASA, Office of Space Station, *The Space Station: A Description of the*

became operational, these ideas once again entered center stage. NASA began to seek support to build a destination for the Shuttle.

"The Next Logical Step"

The Birth of the Space Station Project

The beginning of Reagan Administration in 1981 did not at first bode well for NASA. Although the new President was regarded as interested in space, it was not a high priority. NASA's budget faced strict scrutiny by David Stockman's OMB. At the same time, the Shuttle was consuming a large portion of the total agency budget and was being criticized for cost overruns and delays. However, because the Shuttle was defined as a "national asset," it was relatively safe from budget cuts, but other programs, especially space science, were under serious pressure.

As discussed in Chapter 4, space science programs and "new starts" (proposed new projects) were targeted for cuts. Along with the American half of the ISPM, the *Galileo*, *Magellan*, and *Cassini* planetary probes, and the *Hubble* Space Telescope had their budgets cut and launches delayed.[20] In addition,

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Configuration Established at the Systems Requirements Reviews (SRR) (Washington: NASA, 1986), 37.

[20] *Magellan* was a space probe designed to orbit and radar-map Venus. It was launched in 1989. *Cassini* is a space probe designed to explore Saturn and its moons. It carries with it a European built probe called *Huygens* that will enter the atmosphere of Saturn's large moon Titan. It was launched in October 1997.

NASA was forced to reduce the number of Shuttle-*Spacelab* missions.[21] It was in this atmosphere that the SSP was born. The designs, possible missions, and arguments that emerged in the early 1980s would define the SSP to the present.

Despite the Administration's budget cutting, NASA began to push for a space station as a new start. The first operational Space Shuttle, *Columbia,* was successfully launched in April of 1981 (Shuttle mission STS-1), generating considerable public and presidential interest. The new NASA administrator was James Beggs, a General Dynamics executive with NASA experience in the 1960s. Beggs quickly entered into discussions with serving and potential NASA officials about possible new directions for the agency. During the Reagan transition period, Beggs and his new deputy Hans Mark (the Air Force Secretary in the outgoing Carter Administration with a strong interest in space), agreed that the development of a space station would be the best new project for the agency.[22] When Beggs and Mark came before a fairly friendly Congressional confirmation hearing in June 1981, they used the opportunity to propose a space station as "the next step," after the shuttle. When Senator (and *Apollo 17* astronaut) Jack Schmitt (R.-NM) asked about an overall mission for NASA, Beggs responded: "It seems to me the next step is a space station. That is the thing that will make a lot of other things possible in the future...

[21] "Spacelab, Solar-Polar Curtailed," *Aviation Week and Space Technology* (23 February 1981), 18-9.

Beyond that, of course, that opens up all kinds of potential applications and all kinds of interesting-- both scientific and practical applications type work."[23]

Between 1981 and 1983, NASA initiated design studies and there were additional calls for a space station by NASA officials. In July, the NASA Advisory Council echoed Beggs and Mark by calling a space station "the next logical step," a phrase that rapidly became the semi-official slogan of the SSP for the first half of its existence. Internally, Beggs and the top NASA officials initiated discussions throughout the agency on the uses of a space station and how it could be presented to the President and Congress.[24] Other internal meetings were held to discuss various ideas, ranging from large permanent space stations to a smaller, periodically occupied, "Man-Tended Station."[25] There were also proposals to upgrade one or more Shuttles for 30-day extended flights.[26]

Within NASA, a Space Station Task Force was created in May 1982. Headed by NASA veteran Phil Culbertson and John Hodge (from the Department of Transportation), the Task Force was charged with investigating

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[22] Interview With James Beggs, 22 July 1999. Hans Mark, *The Space Station: A Personal Journey* (Durham (North Carolina): Duke University Press, 1987), 121.

[23] US Congress, Senate, Committee on Commerce, Science, and Transportation, *Nominations-NASA* (Washington: US Government Printing Office, 1981).

[24] An internal document produced by Hans Mark and Milton Silveira identified national security and space infrastructure as possible justifications (Hans Mark and Milton Silveira, "Notes on Long Range Planning," in Mark 1987, 237-40.

[25] "Man-Tended" refers to an orbital facility that would not be permanently occupied but periodically visited by astronauts.

[26] Another item on NASA's wish list was construction of a "Fifth Orbiter," as an addition to the then-planned fleet of four. The construction of a fifth orbiter was supported by the Defense Department and many members of Congress as an alternative to the more costly Space Station.

designs, users, and to signal that the Space Station was a serious, if yet unofficial, idea. According to Hodge, although the members of the Task Force believed in the value of a space station, their goal was to develop an effective "story" to gain Congressional support.[27] The purposes of a space station were still open to interpretation, although it was described as both a destination and a mission for the Shuttle. In speeches and articles written in the aerospace press, NASA officials promoted the space station idea and outlined its potential uses.

The International Context

NASA consulted with European, Canadian, and Japanese officials for several months about possible space station activities.[28] Discussions were informal and it was made clear that NASA had no legislative backing for anything beyond conceptual studies. Conversations focused on possible hardware contributions and the use partners could make of a space station. There were direct meetings between NASA and Japanese space officials in June 1982. In May and June of the following year, as a means of promoting both the Shuttle and the idea of a space station, Beggs and Mark flew to London, Paris, Bonn, and Rome to consult with European space officials. These talks were intended not only to promote the Space Station program but

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[27] Interview With John Hodge, 4 June 1998.

also to gauge the interest of the allies, and to develop design and utilization plans. Despite tensions over the ISPM cancellation and disappointments about *Spacelab*, European space officials were still interested in cooperation with NASA and in fact needed the U.S. to pursue major projects of their own. This trip attracted a great deal of public attention in Europe because the Space Shuttle prototype, *Enterprise*, was flown to Europe with the NASA team.[29]

While proposed as a domestic program, it was widely acknowledged within NASA that international participation would be necessary for a project as large a space station.[30] The cost of a station would be so great that international participation would be needed to help justify and reduce the cost.[31] In addition, the international partners would also provide additional political support for the project. Although international projects tend to be more complex to manage,[32] there is also, to a certain degree, an "international culture" within NASA that is comfortable cooperating with other countries.[33] NASA publications that appeared in subsequent years speak of an "international tradition" at NASA

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[28] Interview With Diana Hoyt, 28 May 1998. Diana Hoyt has served as Chief of Staff to the Congressional Space Caucus and in the NASA Policy and Plans division. See also, Mark 1987, 153-61.

[29] Hans Mark writes of large crowds gathering to see the *Enterprise* fly over on its 747 carrier aircraft (Mark 1987, 157-8).

[30] Interview With James Beggs, 22 July 1999; Roger Bilstein, *Space Station Configurations and Phase-B Studies at JSC* (Houston: NASA Lyndon B. Johnson Space Center, 1988).

[31] Interview With Philip Culbertson, 7 April 1998; Culbertson 1982, 37-59. Philip Culbertson held many positions within NASA including Associate Deputy Administrator.

[32] Interview With Richard Truly, 4 September 1998. Richard Truly was a NASA astronaut (flying two Shuttle missions) and later served as NASA Administrator (1989-92).

[33] Several interveiwees reported a belief within NASA that any space station program, or any other major space program would require international participation (Interview With Philip Culbertson, 7 April 1998; Interview With Margaret Finarelli, 8 June 1998; Interview With John

that the SSP fit into naturally. The White House also supported the idea of international participation early in the process. Both the White House staff and the President himself, inquired about the possibility of international participation independently of the NASA offices.[34]

Domestic Context: "The Marketing Problem"

The decision to build the Space Station was the result of three years of careful "marketing" of the idea to Congress and President Reagan.[35] Members of Congress and their staffers were a major focus of lobbying.[36] NASA officials worked with the House Space Caucus to build support among members of Congress for space activities. Various publicity building activities, including sending members bottles of the space-associated *Tang* drink, were also used to keep NASA visible to Congress.[37] In private talks with members and staffers, NASA officials stressed the non-partisan nature of the space program and worked with known allies in Congress to build as widespread support as

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Hodge, 4 June 1998). Margaret Finarelli represented NASA in White House committees and also served with NASA International Affairs Division.

[34] Interview With Hans Mark, 23 January 1998.

[35] An excellent detailed account of the process may be found in Howard McCurdy, *The Space Station Decision: Incremental Politics and Technological Change* (Baltimore: Johns Hopkins University Press, 1990). Hans Mark's memoirs (Mark 1987) provide an insider's perspective. This study in indebted to each of these works.

[36] Federal employees are forbidden by law to "lobby" members of Congress, and such activity, while in practice lobbying, is not referred to as such. It is usually referred to as a "briefing" session.

[37] Confidential Interview.

possible.[38] Direct advocacy occurred in hearings, especially budget and appropriations hearings. Following up on the comments made in his confirmation hearing, Beggs stressed the value of "permanent space facilities," in 1983 Congressional hearings.[39]

A significant hearing held in August 1983 gave a NASA team led by John Hodge, an opportunity to make its case for the Space Station.[40] Presentations consisted of a fairly detailed overview of the technical issues involved in designing and building a space station, and a report of NASA's then-recent studies. Hodge's presentation was important as it was an overview of the entire space station concept. Hodge emphasized several points: the logic of building a space station after the Shuttle, the value of "Man in Space," and the multiple uses of a space station. He also highlighted the space station activities of the Soviet Union. This presentation was a mixture of vague potentialities and muted urgency: "I think it would remiss of us not to look to the future. And as we look at the potential for the space program over the next 25

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[38] "Briefing/Discussion with Congressional Staff on Space Station" (NASA Historical Collection, 1983); Terence Finn, "Note to A/Mr. Beggs" (NASA Historical Collection, 1984). James Beggs urged the consideration of a space station during hearings on NASA's 1984 budget in March 1983 (US Congress, Senate, Committee on Commerce, Science and Transportation, Subcommittee on Science, Technology, and Space, *NASA Authorization for Fiscal Year 1984* (Washington: Government Printing Office, 1983).
[39] US Congress, Senate, Committee on Commerce, Science and Transportation, Subcommittee on Science, Technology, and Space, *NASA Authorization for Fiscal Year 1984* (Washington: Government Printing Office, 1983), 50.
[40] John Hodge was then Director of the Space Station Task Force. Hodge was accompanied by Task Force Deputy Director Robert Freitag, and Kenneth Pedersen was Head of NASA's International Affairs Office.
Freitag answered some of the Committee's technical questions and Pedersen discussed the contacts then underway with potential space station partners.

to 50 years, and we start to install this infrastructure in low Earth orbit, we should think in terms of its ability to make possible future missions... We can return to the Moon; we can go to Mars; and we can send things to geosynchronous orbit"[41]

More vital than Congress to NASA's strategy was the White House. NASA officials were aware that Reagan was interested in the space program and used every opportunity to capitalize on this. In November 1981, NASA arranged for Reagan to speak to the orbiting crew of the second Shuttle mission (STS-2) from Mission Control in Houston.[42] Following the success of this event, NASA made every effort to make space visible to the President. On 4 July 1982, Reagan made a speech after the landing of Shuttle *Columbia* at Edwards Air Force Base, ending the STS-4 mission. This was the fourth and last "developmental" flight of the Space Shuttle system and NASA was ready to declare the testing phase of the Shuttle system completed, and the Shuttle fleet (not yet completed) as fully operational.[43]

NASA and the White House staff negotiated the speech Reagan gave after the landing of *Columbia*. The setting was appropriate, with the President greeting returning astronauts in a patriotic setting full of flags and half a million

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[41] John Hodge in US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983), 4.

[42] Mark 1987, 134.

[43] There have been six Space Shuttle vehicles. At the time of the STS-4 mission, the only *Columbia* had flown in space. *Challenger* and *Discovery* had been completed, while the fourth

spectators.[44] The newest Shuttle, *Challenger*, flew overhead on its carrier aircraft during Reagan's speech. The speech itself inched the Administration closer to announcing a space station project. NASA's draft speech, written by Hans Mark, introduced the phrase, "a permanent presence in space" and announced the start of a space station project. Reagan's final speech parallels the NASA draft but did not initiate a new program. It did, however, retain the phrase, "a more permanent presence in space" as a national goal. While less of an endorsement than NASA sought, the speech was a victory over Administration officials like White House Science Advisor George Keyworth, who tried to block the phrase from Reagan's speech entirely.[45]

More active lobbying by NASA and its supporters followed. White House advisors, DoD, and the OMB were major targets of lobbying, although little support was gained from the other federal agencies.[46] NASA ultimately appealed directly to Reagan at a White House briefing on 1 December 1983. The forum was the Cabinet Council for Commerce and Trade. Reagan and key

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Shuttle, *Atlantis* was still under construction. *Enterprise* was a test-bed and was never intended to be flown in space. *Endeavour* was built in the late 1980s to replace *Challenger*.

[44] William H. Gregory, "Better Than Nothing," *Aviation Week and Space Technology* (12 July 1982), 13; Mark 1987, 150-51.

[45] Ronald Reagan, "Remarks at Edwards Air Force Base, California, on Completion of the Fourth Mission of the Space Shuttle *Columbia*" In *Public Papers of the Presidents of the United States: Ronald Reagan, 1982, Book II, July 3 to December 31, 1982* (Washington: US Government Printing Office, 1983), 892-94. Mark's draft is reproduced in Mark 1987, 148. Keyworth was a physicist from the Los Alamos National Laboratory. He was appointed Director of the Office of Science and Technology policy in May 1981(Ronald Reagan, "Nomination of George A. Keyworth II to be Director of the Office of Science and Technology Policy" In *Public Papers of the Presidents of the United States: Ronald Reagan, 1981, Book I, January 20 to December 31, 1981* (Washington: US Government Printing Office, 1982), 443.

[46] Terence Finn, "Note to ADB/Mr. Culbertson" (Washington: NASA Historical Collection, 1982); Terence Finn, "Note to MT-14/John Hodge" (Washington: NASA Historical Collection, 1982).

Cabinet departments and agencies were represented in this Committee, including Commerce, DoD, the CIA, the White House Chief of Staff, and Science Advisor Keyworth.[47] James Beggs, Hans Mark, and John Hodge represented NASA, supported by Gil Rye, a space station supporter from the National Security Council.[48] This briefing was NASA's best opportunity to argue the case for a space station before Reagan.

The presentation, consisting of viewgraphs and comments by Beggs, guided by a set of "Talking Points," focused on three key points.[49] The first point, described in the "Talking Points," was keeping "America preeminent in space." The presentation slides included quotes by John Kennedy and Richard Nixon stressing the need to maintain American leadership in space. The second key point was the scale of Soviet space activities and hints of new Soviet space developments: a large space station and a shuttle. "The Soviets understand the importance of man in space," the "Talking Points" claimed. The need for the US to respond to this "threat" was implicit. A final recurring theme evident in the presentation was the value of the space program in presenting a

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[47] In the Cabinet Council meeting, Keyworth had advocated a more ambitious Moon base plan, although he later supported the Station after Reagan approved it (*Defense Daily*. "Boland Questions Need For Manned Station. Keyworth Says Opportunities Justify Venture" *Defense Daily* (9 February 1984), 226-7.

[48] Mark 1987, 184-87.

[49] The NASA Historical Collection includes a copy of the notes used by the NASA team when meeting with Reagan ("Revised Talking Points For the Space Station Presentation to the President and the Cabinet Council" (Washington: NASA Historical Collection, 1983). A handwritten note on the first page lists the NASA personnel present as James Beggs, Hans Mark, and Philip Culbertson. Also in the NASA files are the viewgraphs used in the presentation (NASA, "Presentation on Space Station" (Washington: NASA Historical Collection, 1983). The quotes in this paragraph are taken from either the "Talking Points" or viewgraph collection.

positive image of the US abroad. Space flights projected an image of a strong, confident America endowed with great technological prowess; the Shuttle had generated "worldwide attention," according to one viewgraphs. Another viewgraph highlighted the value of a space station as "A highly visible symbol of U.S. strength." The presentation also noted the economic and commercial benefits that a station would generate. Although a majority of the Cabinet and White House officials opposed building a space station, according to James Beggs, Reagan said "I want to do this." The next day Presidential aide James Baker called Beggs to tell him, "you won."[50] The Space Station Project was born.

Opposition, 1980 to 1984

Despite Reagan's decision and the united front presented by NASA, support for the SSP was not widespread in the government. Opponents attempted to resist the Station by calling its purpose into question or challenging NASA to choose a more ambitious project. Prior to Reagan's decision, opposition within the Executive branch was open and vocal. White House official Victor Reis[51] questioned the need for a space station during a

[50] Interview With James Beggs, 22 July 1999.
[51] Then Assistant Director for National Security in the White House Office of Science and Technology

Congressional hearing in November 1983.[52] The State Department, the CIA, and OMB were all against the Space Station and had argued against it at the Cabinet Council in December.[53] CIA director William Casey viewed the Space Station as a budgetary threat and plainly told this to James Beggs, apparently expecting that any additional money spent for space would come from the military-intelligence budget.[54]

Opposition also came from the US military. NASA had sought support from the DoD as it had for the Shuttle. The official Pentagon position, established in the early 1980s and often repeated, was extremely reticent, offering no support but not openly attacking the project either. When Richard DeLauer, Under Secretary of Defense for Research and Engineering, testified before a Congressional committee in March of 1983, he was cautiously neutral towards space station planning: "we are just very cautious about being too bullish on [the] space station until we really know what it looks like as a program and that is NASA's responsibility to lay it out but we have supported their planning."[55] The standard military comment was that there were no

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[52] See US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *Civil Space Station* (Washington: Government Printing Office, 1983).
[53] Interview With Margaret Finarelli, 8 June 1998; Interview With Hans Mark, 23 January 1998.
[54] Interview With James Beggs, 22 July 1999.
[55] US Congress, *NASA Authorization for Fiscal Year 1984*, 17.

foreseeable military missions for a space station and that the DoD could not support the proposal.[56]

Two separate DoD communications to James Beggs represent the military position in the early 1980s. A letter from Paul Thayer (Deputy Secretary of Defense) dated 11 August 1983 (before Reagan's decision) clearly stated that there was no military interest for a space station.[57] The DoD was clearly focused on the Shuttle as the means to launch classified payloads and was wary of anything that might overburden the Shuttle flight schedule or divert limited government funds. A letter from Defense Secretary Casper Weinburger to Beggs on 16 January 1984 ruled out DoD support for the SSP: "a major new start of this magnitude would inevitably divert NASA managerial talent and resources from the priority task of making the Space Transportation System fully operational."[58] According to Beggs, Weinburger was "very upset when the space station was proposed," and actively argued against it.[59]

Pentagon officials were disturbed that a large new project at NASA would divert funds from Shuttle development and operations. DoD also preferred that NASA build a fifth Shuttle orbiter rather than a space station. Technology transfer issues were also a DoD concern, though financing for

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[56] Richard De Lauer, "Military Space Activities and a Space Station" In *Space Station: Policy, Planning, and Utilization: Proceedings of the AIAA/NASA Symposium on the Space Station* (Washington: AIAA/NASA, 1983), 40-1.
[57] Paul Thayer, "Letter From Paul Thayer to James Beggs" (Washington: NASA Historical Collection, 1983).
[58] Casper Weinberger, "Letter From Casper Weinberger to James Beggs" (Washington: NASA Historical Collection, 1984).

military space activities were the primary interest.[60] While ambivalent towards the Space Station, the Defense Department kept its options open and continued to study military use of a space station.[61] In later years, the Defense department briefly changed its public position on the Space Station, to the embarrassment of NASA. That part of the story is recounted in Chapter 7.

"We Can Follow Our Dreams to The Distant Stars"

Against the advice of his advisors, Reagan moved forward. On 25 January 1984, in the ceremonial setting of his State of the Union Address, Reagan announced his decision to build the space station and framed it as matter of national power and glory:

> America has always been greatest when we dared to be great. We can reach for greatness again. We can follow our dreams to distant stars, living and working in space for peaceful, economic, and scientific gain. Tonight, I am directing NASA to develop a permanently manned space station and to do so within a decade.[62]

The setting, and the "within a decade" timetable were clearly reminiscent of John F. Kennedy initiating the Apollo program. However, as McCurdy notes,

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[59] Interview With James Beggs, 22 July 1999.
[60] Interview With James Beggs, 22 July 1999.
[61] Philip Culbertson, Interviewed by Sylvia D. Fries and Howard McCurdy (Washington: NASA Historical Collection, 1988).
[62] This and following quotations are from Ronald Reagan, "Address Before a Joint Session of the Congress on the State of the Union" In *Public Papers of the Presidents of the United States: Ronald Reagan, 1984 Book I, 1 January - 29 June 1984* (Washington: US Government Printing Office, 1986), 87-94. The segment of Reagan's speech that addressed the Space Station has been widely reprinted and quoted in NASA publications to emphasize the Presidential origin of

Reagan announced the start of the program as an executive act rather than as a proposal for Congress to consider.[63] Reagan clearly stated: "I am *directing* NASA to develop a permanently manned space station." He prefaced the announcement by praising American national greatness and its "pioneering spirit" as the source of that greatness: "Nowhere is this more important than our next frontier: space. Nowhere do we so effectively demonstrate our technological leadership." By asserting that America could "reach for greatness again," Reagan linked space exploration to progress, American national pride, and the theme of renewal that had dominated the 1980 Reagan presidential campaign and Administration rhetoric.

In this speech, Reagan was not very specific regarding the uses of the Space Station, but drew on broad mission goals that we have already seen. He alluded to a few specific functions of the Station and to the political, economic, and social benefits that would arise from it. These proposed uses were reminiscent of those missions discussed by NASA over the previous decade and articulated in the publications and speeches of Beggs, Culbertson, and Hodge and others at NASA during the previous years:

> A space station will permit quantum leaps in our research in science, communications, in metals, and in life saving medicines which could be manufactured only in space. We want our friends to help us meet these challenges and share in their benefits...we can strengthen

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the Station Project. One example is, NASA. *Aeronautics and Space Report of the President: 1984* (Washington: NASA, 1984), 1.

[63] Howard McCurdy, *The Space Station Decision: Incremental Politics and Technological Change* (Baltimore: Johns Hopkins University Press, 1990), 191.

> peace, build prosperity, and expand freedom for all who share our goals.

NASA was successful in initiating the SSP by winning "its key constituency of one" as the *Washington Post* noted in 1993.[64] NASA won the Space Station campaign because it won the attention of President Reagan. James Beggs notes that, while Reagan did not understand science or technology in any depth, had an "instinctive feel" for what he wanted to do.[65] Beggs focused the effort on winning approval from Reagan as that was the key hurdle that needed to be overcome. While Congress was also important for the long-term success of the project, the President was the only actor who could start the project. "Ultimately, there was only one person who would have to be convinced that the space station was a good idea, and that person was the president of the United States."[66] Mark's memoirs also note Reagan's interest in the space program, judging from his reaction to the early Shuttle missions and the Cabinet Council meeting. Reagan's attention to space, as well as S&T in general, were based on a belief that they demonstrated American leadership.[67]

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[64] Kathy Sawyer, "Space Station Tethered By Earthly Concerns," *Washington Post* (17 May 1993), A1, A12-A3.
[65] Interview With James Beggs, 22 July 1999.
[66] Mark 1987, 132

The Role of the International Partners

After Reagan's State of the Union speech, James Beggs undertook another trip to allied capitals as the President's special representative, formally inviting countries to participate. As many of the preliminary contacts had already been made, acceptance by the partners was relatively swift. Several of the ESA countries, Canada, and Japan accepted the US invitation. Multiple partner-states required a legal framework, which was set forth in a group of agreements signed between the participating countries and agencies. The major issues that needed to be resolved were the exact contributions each partner would bring to the project and the distribution of Station resources in the form of crew time, power, and laboratory space (see Figures 5.2 and 5.3).

Three sets of agreements have governed the SSP: 1) a set of three Memoranda of Understanding (MOU) signed in 1985; 2) an Intergovernmental Agreement (IGA) and three MOUs signed in 1988; and 3) a final set of agreements signed in 1998. Figure 5.4 provides an overview of the agreements.[68] The final set involved Russia and will be discussed below.

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[67] Interview With Margaret Finarelli, 8 June 1998.

[68] The agencies participating in the SSP (i.e. acting in the names of their respective countries) are: for Canada, the Ministry of State for Science and Technology (to 1989), the Canadian Space Agency (1989 and after), for the European partners the European Space Agency, for Japan the National Space Development Agency of the Science and Technology Agency, and for Russia the Russian Space Agency. The IGAs were signed in the name of the governments while the MOUs were signed in the name of the agencies, except in the case of the Government of Japan, which signed the MOU.

Figure 5.2.
Major National Contributions to The Space Station Project

1984 to 1993

COUNTRY	UTILIZATION/ ACCOMMODATION	INFRASTRUCTURE/SUPPORT
Canada		Remote Manipulator System
European Space Agency	Columbus Orbital Facility (Laboratory)	
Japan	Japanese Experimental Module (Laboratory)	
United States	Laboratory Module; Habitation Module;	Solar Panels; Docking Units; Thermal Control Units; Station Superstructure (Trusswork).

1993 to Present

COUNTRY	UTILIZATION/ ACCOMMODATION	INFRASTRUCTURE/SUPPORT
Brazil	Unpressurized Logistics Carrier; Express Pallet	
Canada		Remote Manipulator System
European Space Agency	Columbus Orbital Facility (Laboratory)	ATV Transfer Vehicle
Italy	Multi-Purpose Laboratory Modules (3)	
Japan	Japanese Experimental Module (Laboratory)	HTV Transfer Vehicle
Russia	Laboratory Modules (2)	Service Module Docking Modules (2) *Soyuz* Crew Return Vehicles (2) Progress Resupply Vehicles Science Power Platform
United States	Laboratory Module Habitation Module Centrifuge (Japanese-built)	X-38 Crew Return Vehicle Nodes (3) Functional Cargo Block (Russian-built)* Solar Panels Thermal Control Units Station Superstructure (Trusswork)

* Although the Functional cargo Block was built in Russia, it was developed by a Russian company under contract to Boeing. NASA therefore considers it to be an American element (Smith 1995, 3 fn).

Source. NASA, *International Space Station Fact Book 1999.*

Figure 5.3. Utilization Shares of Space Station Resources

1988

RACK SPACE	USA	CANADA	ESA	JAPAN
US Lab Module	97%	3%	0%	0%
ESA Columbus Lab	46%	3%	51%	0%
Japanese Experimental Module	46%	3%	0%	51%
CREW PERCENTAGE OVER TIME*	71.4%	3%	12.8%	12.8%
POWER AND RESOURCES AFTER HOUSEKEEPING*	71.4%	3%	12.8%	12.8%

1998

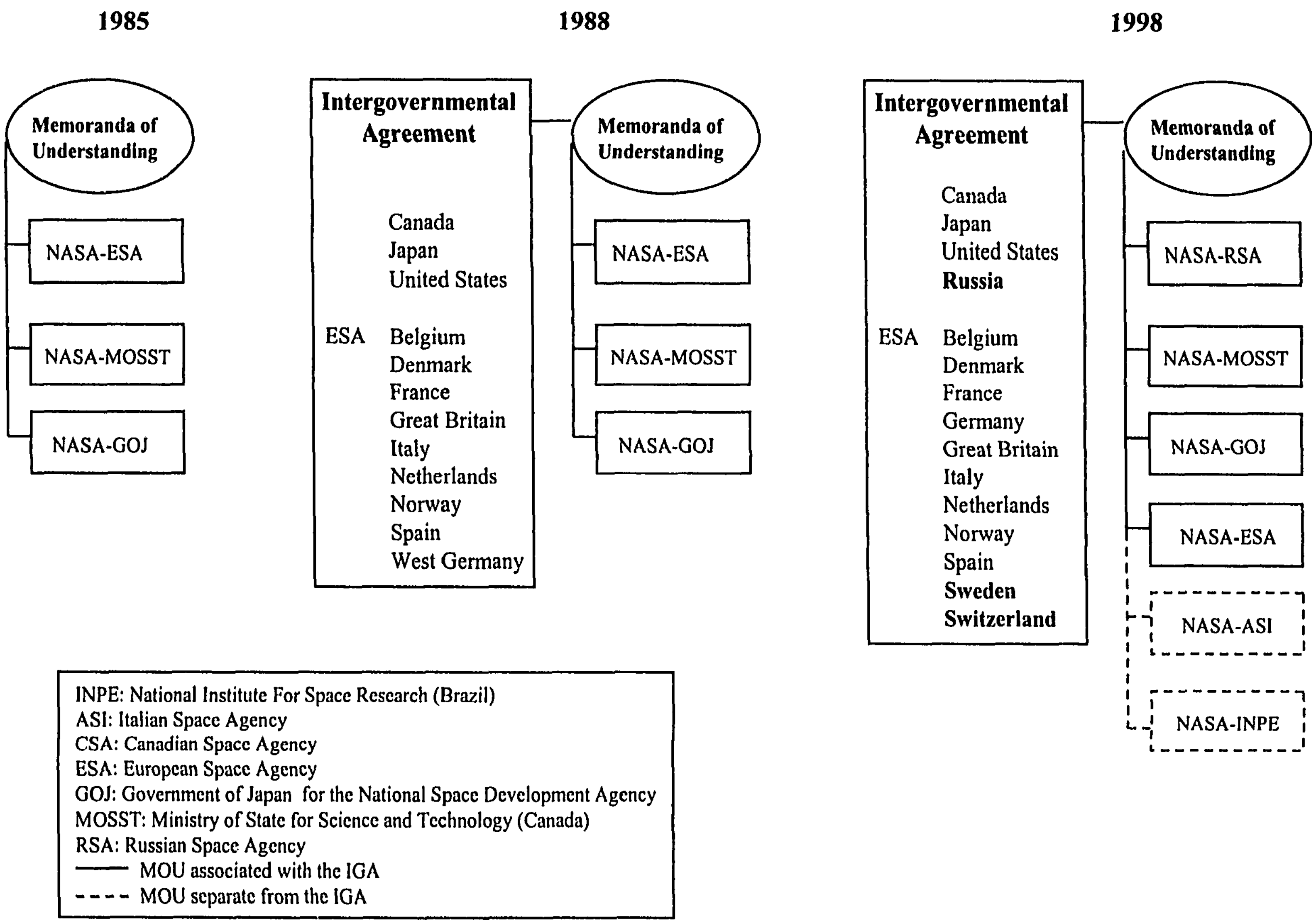
RACK SPACE	USA	CANADA	ESA	JAPAN	RUSSIA
US Lab Module	97.7%	2.3%	0%	0%	0%
ESA Columbus Lab	46.7%	2.3%	51%	0%	0%
Japanese Experimental Module	46.7%	2.3%	0%	51%	0%
Russian Lab Modules	0%	0%	0%	0%	100%
CREW PERCENTAGE OVER TIME*	44%	1%	5%	7%	43%
POWER AND RESOURCES AFTER HOUSEKEEPING*	76.6%†	2.3%†	8.3%†	12.8%†	100%‡

* When Station is at Permanent Operation Capacity
† Percentage of American provided power and resources.
‡ Percentage of Russian provided power and resources.

The US percentages include resources provided to Italy and Brazil in exchange for their bi-lateral participation.

Source. Cline, *International Space Station Agreements*; Cline 1996; Cline 1998; Cline and Gibbs 1997.

Figure 5.4. SPACE STATION AGREEMENTS, 1985-1998



The MOUs were signed between the participating space agencies, with the exception of the Japanese Government, which signed for its space agency. In the MOU talks, the space agencies represented each partner and NASA took the lead role as "chair" of the meetings. The IGAs were more formal documents signed by foreign ministries. The partners, especially ESA, had sought a treaty to formally bind the US to the project, recalling the American use of the MOU escape clause during the ISPM program. However, while the other partners under the 1988 IGA submitted the agreements for legislative approval, the US government regarded it as an executive agreement and did not submit it to the Senate for approval.[69]

The 1985 MOUs (Figure 5.5) governed the definition and design of the Space Station (referred to as Phase B development).[70] These agreements did not commit the signatories beyond the Phase B stage of the project.[71] The 1988

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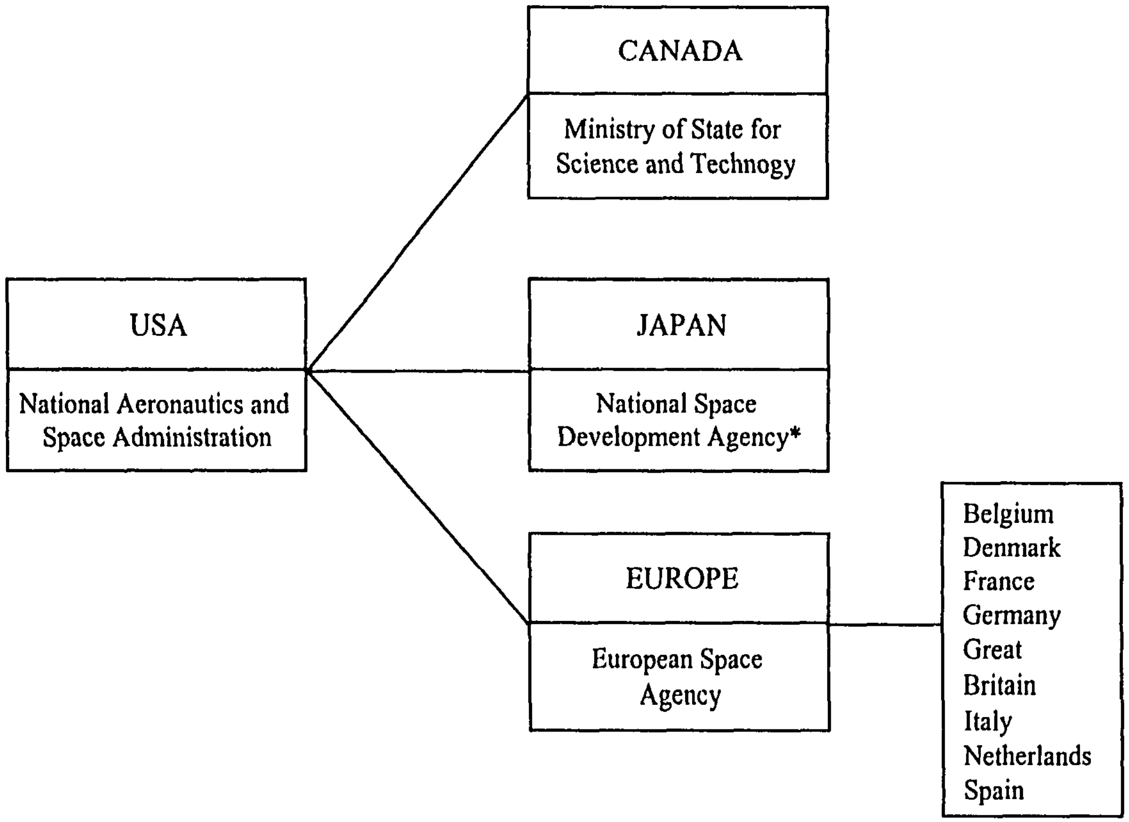
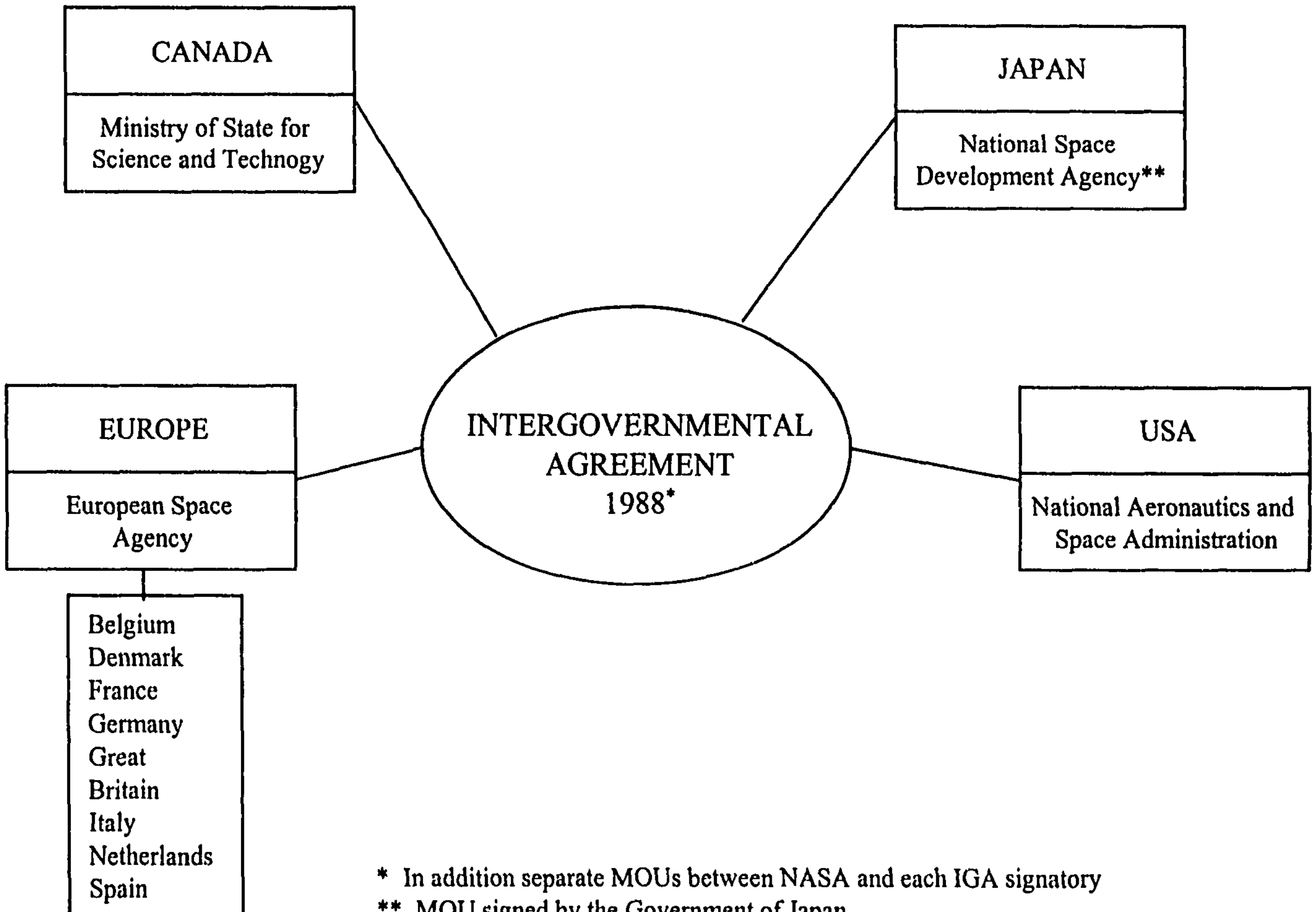
[69] John Logsdon, "International Cooperation in the Space Station Programme," *Space Policy* (February 1991), 38.
[70] *Memorandum of Understanding Between the National Aeronautics and Space Administration and the European Space Agency for the Conduct of Parallel Detailed Definition and Preliminary Design Studies (Phase B) Leading Toward Further Cooperation in the Development, Operation and Utilization of a Permanently Manned Space Station,* In *Treaties and International Agreements Series*, TIAS 11351 (Washington: US Department of State, 1985). Hereafter, NASA-ESA 1985.
Memorandum of Understanding (MOU) Between the National Aeronautics and Space Administration and the Ministry of State for Science and Technology for the Cooperative Program Concerning Detailed Definition and Preliminary Design (Phase B) of a Permanently Manned Space Station. Signed at Ottawa 16 April 1985 (Washington: US Department of State, 1985). TIAS 11180. Hereafter, NASA-MOSST 1985.
Memorandum of Understanding Between the United States National Aeronautics and Space Administration and the Science and Technology Agency of Japan for the Cooperative Program Concerning Detailed Definition and Preliminary Design Activities of a Permanently Manned Space Station. Signed at Tokyo 9 May 1985 (Washington: The US Department of State, 1985). TIAS 11327. Hereafter, NASA-STA 1985.
[71] NASA-ESA 1985, Article 1.2; NASA-STA 1985, Preamble; NASA-MOSST, Preamble.

Figure 5.5. SPACE STATION PHASE B AGREEMENTS, 1985
Participating Countries and Agencies



* MOU signed by the Government of Japan

Figure 5.6. SPACE STATION AGREEMENTS, 1988-1998
Participating Countries and Agencies



* In addition separate MOUs between NASA and each IGA signatory
** MOU signed by the Government of Japan

agreements (Figure 5.6), covered development and operation of the completed SSP and consisted of four agreements: three additional MOUs between the agencies, capped by an IGA between the participating countries.[72] Although NASA chaired the MOU talks, interagency approval was necessary at each step: the Defense and State Departments were "looking over our shoulder during the talks," according to Philip Culbertson.[73]

The European Space Agency

Under the MOUs, ESA agreed to provide an "attached laboratory" and two unpiloted platforms in independent orbits. The laboratory, *Columbus*, is derived from the *Spacelab* modules. This module shall perform life science and other research using the SSP power in exchange for American and Canadian use of the module (see Figure 5.3). ESA originally planned to develop a crew-tended platform, co-orbiting with the SSP, for material processing. A second

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[72] *Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation and Utilization of the Permanently Manned Civil Space Station* (Oceana Publications, 1989). Hereafter, IGA 1988. *Memorandum of Understanding Between the National Aeronautics and Space Administration and the European Space Agency on Cooperation in the Detailed Design, Development, Operation and Utilization of the Permanently Manned Civil Space Station. Signed in Washington* (Oceana Publications, 1989). Hereafter, NASA-ESA 1988. The MOUs signed with the Japan and Canada have not been published by the US State Department. The analysis here is based on the ESA MOU and interviews with relevant NASA officials.
[73] Philip Culbertson, Interview With Author, 7 April 1998.

platform was to be placed in polar orbit and would be dedicated to Earth observation and solar studies.[74] These "free-flyers" were later cancelled.

Columbus had already been under consideration and in 1985 ESA's Council approved the project as the European contribution to the SSP. The Agency also approved the development an advanced rocket, the *Ariane 5*, and a small space shuttle (*Hermes*), each of which were seen as potential contributions to the SSP. In the 1988 agreements, ESA secured the right to use its *Ariane* rockets to service and supply the Space Station.[75] *Hermes* was also considered as a potential Space Station crew transport vehicle, although the Shuttle was still regarded as the primary means of assembly and transportation.

ESA was a single organization but it represented 13 (later 14) countries, of which 9 (later 11) were participating in varying degrees in the SSP.[76] ESA's decision-making process was therefore slower and more opaque than that of the other partners (the US included). This at times caused consternation on the US side, as different voices spoke for ESA and different countries pursued

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[74] NASA, Office of Space Station, *The Space Station: A Description of the Configuration Established at the Systems Requirements Reviews (SRR)* (Washington: NASA, 1986).
[75] France would not sign onto the SSP unless the right to use *Ariane* was included and US negotiators felt that without France, ESA would not be a viable partner (Lynn Cline, Interview by Author, 9 July 1999).
[76] The 1988 IGA was signed by 9 of the then 13 members of ESA: Belgium, Denmark, France, Great Britain, Italy, Netherlands, Norway, Spain, and West Germany. Sweden and Switzerland signed on with the 1998 IGA. Austria, Ireland, and Finland have not joined the ISS. British participation in the ISS has been nominal since 1997. The primary British interest in the ISS was the European free flyer module. When that part of the program was canceled, Britain reduced its participation (Interview With Michael Hawes, 27 July 1999).

separate interests within the agency.[77] Germany and Italy were most interested in participating in the SSP; Italy even negotiated a bilateral agreement with NASA to provide components in addition to its contribution to *Columbus*. In contrast, France was less enthusiastic about the SSP and more concerned with developing independent European capabilities.[78] The fact that Europe is a major competitor in space services market caused an additional degree of political tension (see Chapter 7).

Japan and NASDA

Like the ESA countries, Japan had been engaged in informal talks with NASA prior to 1984. The Japanese government and its space agency, the National Space Development Agency (NASDA), were interested in expanding Japan's presence in space science and utilization. Japan's contribution, the Japanese Experimental Module (JEM), was initiated in March 1986. Later named *Kibo* ("Hope"), the JEM will be a large complex, consisting of a pressurized lab, and a set of unpressurized instruments.[79] Japan also agreed to provide a centrifuge module for controlled microgravity experiments. In exchange for the American launch of *Kibo*, ownership of the centrifuge will be

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[77] NASA Administrator Truly described ESA's decision making system as a "convoluted process," while John Hodge regarded it as a "crazy" system (Interview With Richard Truly, 4 September 1998; Interview With John Hodge, 4 June 1998).
[78] Interview With James Beggs, 22 July 1999.
[79] NASA, *The Space Station: A Description of the Configuration...*

transferred to NASA.[80] The 1988 agreements also secured Japan's right to use the H-2 rocket a possible launch and servicing vehicle. Despite budget cuts and scale backs by the other partners, Japan's contribution has been fairly consistent over time proving it to be the "most reliable partner" in the words of one official. *Kibo* is now also the largest of the Space Station's laboratory modules.[81]

Canada

The third original Space Station partner was Canada, a country with a variety of interests in space but limited resources. Canada was an early satellite user with the *Alouette 1* satellite, launched by NASA in 1962.[82] Canada contributed significantly to the Shuttle program and gained considerable publicity from the vehicle's "Canadarm." Canada's contribution to the Space Station is the Remote Maintenance System (RMS), a more elaborate version of the Canadarm. The Canadian contribution differs from that of the other original partners as it is an essential component of the Space Station infrastructure.[83] In NASA terminology, it is on the "critical path", as it is necessary for the

[80] Interview With Peter Ahlf, 26 July 1999.
[81] Interview With Lynn Cline, 9 July 1999.
[82] Christopher Trump, "The Canada-United States Relationship in Space" In *Canada, the United States, and Space*, ed. John Kirton (Toronto: Canadian Institute of International Affairs, 1986), 3-13.
[83] IGA 1988, Article 1.2.

successful operation of the Space Station.[84] In exchange for the RMS, Canada shall receive access to the American, European, and Japanese laboratories.

Although the principle of consensus decision-making was the ideal, the partners had limited legal and practical influence on many intricacies of SSP design and planning. Overall, the partners did not have a great deal of input into many vital decisions made about the SSP. One NASA official conceded that the partners had "some but not a lot of input" into management decisions, despite their expensive contributions.[85] Station redesigns were often conducted with limited partner consultation, as recounted by former ESA officials Roger Bonnet and Vittorio Manno in a 1994 book, "The rule of the *fait accompli* was... the basic management practice."[86] The management and dispute resolution procedures in the SSP agreements do require consultation but place ultimate authority with NASA. There was little doubt that under the 1985/1988 agreements, NASA enjoyed final authority on design, crew selection, and decision-making.[87] The partners did not even have much influence on symbolic actions, such as the naming the Space Station. In a wry, if bitter comment, Bonnet and Manno note that "[t]he name of the Station, Freedom, was decided

[84] NASA, *The Space Station: A Description of the Configuration...*
[85] Confidential Interview.
[86] Roger Bonnet and Vittorio Manno, *International Cooperation in Space: The Example of the European Space Agency* (Cambridge (Massachusetts): Cambridge University Press, 1994), 111.
[87] IGA 1988, Article 7: 1, 5; "U.S. Wins Veto Right Over International Station Partners. *Defense Daily* (12 September 1988), 55.

unilaterally, by [Reagan] himself, without consulting the international partners, whose only 'freedom' was to accept the decision of the leader."[88]

The "Revolution of Declining Expectations"

Designing a Space Station

Initial Design Issues

While NASA recruited partners, engineers attempted to operationalize the space station concept. Initiating the project was only the first of many hurdles. It had been a deliberate strategy to avoid a specific space station design. John Hodge had even ordered his staff at the Space Station Task Force to destroy all drawings and doodles to avoid locking NASA into a premature design.[89] Due to its long conceptual history the term "space station" meant different things to different people; the term covered a vast array of possible designs and assumptions. The most ambitious (and costly) designs of engineers were never likely to receive political approval, but to fulfill even a fraction of the goals described above, a space station would need to be large, flexible, and have more electrical power than any previous spacecraft.

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[88] Bonnet and Manno 1994, 111.

[89] US Congress, *NASA's Space Station Activities*, 93. A model of a space station was put together prior to the Cabinet Council meeting and used at the G-7 Summit in May 1984, but it was a general conceptual model and, as Beggs commented, "not a good one" (Interview With James Beggs, 22 July 1999).

The designers had to balance several factors, the most important being cost versus the scale of design. These were technical but also political factors. In 1984, the total Station package was projected to cost about $8 billion over a 30-year life span. However, the cost estimates were highly variable and rose sharply. An additional question was the degree to which new technology would be developed in lieu of existing "off the shelf" hardware. The efficiency and stability of the structure had to be balanced with crew accessibility and safety. The Shuttle, conceived in the 1960s to support, but not build a space station, was now needed for that very mission.[90] Therefore, the original sequence was now reversed and the SSP now had to be designed around the Shuttle's capabilities and limits. The Space Station would need to consist of modular units that fit in the Shuttle's cargo bay. It would therefore need to be capable of evolutionary growth. The design differences, and the redesign processes themselves, are significant in that they show the changing mission profiles of the SSP and the impact of political decisions on technology development and use. The architecture and cost of the Station would change greatly over time and these changes would greatly restrict the potential missions of the Station. John Pike of the Federation of American Scientists referred to the reduction of Station missions and rising cost as the "Revolution of Declining Expectations,"

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[90] The 1969 plan called for the station to be lunched by Saturn-type rockets, not the Shuttle (McCurdy 1990, 24-5).

a phenomena that raised serious doubts about the scientific utility of the project.[91]

Of the many architectural designs proposed for the Space Station, four are the most significant. Each, except for the present version, have been abandoned: the Power Tower, the Dual Keel, the "Alpha" Option, and the current design, which may be called "Alpha with Russia." These designs are all variations on the same theme in that they all include habitation, laboratory, infrastructure modules, and the contributions of the original partners, Europe, Japan, and Canada.

The initial design was envisioned as a large modular structure in a 100-200 mile orbit, inclined about 28.5° to the equator, putting it within range of the Shuttle's maximum payload orbit.[92] The Station would have a number of pressurized modules for habitation and research by 6-8 crew members. In addition to the main Station, there would be several "free-flying" robot modules in independent orbits. These free-flyers were intended for scientific research, primarily material processing experiments. Physical separation from the main Space Station would make microgravity experiments more efficient. These modules, as well as other parts of Earth orbit, would be accessible by means of

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[91] US Congress, House of Representatives, Committee on Government Operation, Subcommittee on Government Activities and Transportation, *Cost, Justification, and Benefits of NASA's Space Station* (Washington: Government Printing Office, 1991).
US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *NASA's Plan to Restructure Space Station Freedom* (Washington: Government Printing Office, 1991).
[92] US Congress, *Cost, Justification, and Benefits...*

the Shuttle or a never-built Orbital Maneuvering Vehicle (OMV).[93] Another proposed spacecraft, also never developed, the Orbital Transfer Vehicle (OTV), would have been used to boost payloads to higher orbits.[94]

The first fairly firm design concept to emerge in the aftermath of Reagan's speech became known as the "Power Tower," finalized in July 1984. The "tower" portion consisted of a 120-meter (400 feet) truss beam about 2.4 meters (8 feet) across, upon which the modules and other equipment would be mounted.[95] The "Power Tower" was eventually abandoned in favor of a different design, which became known as the "Dual Keel." This design was adapted in response to the needs of the potential user community. The design had a more stable microgravity environment and more mounting space for external payloads.[96] The design was based on one horizontal truss beam of 95 meters (315 feet) with a large rectangle of vertical booms 124 meters (414 feet) long, at the center of the horizontal boom.[97] Variations on the Dual Keel were the working Space Station design for the next several years.

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[93] NASA, *Aeronautics and Space Report of the President: 1983* (Washington: NASA, 1983); John Hodge, "The Space Station Program Plan," *Aerospace America* (September 1984), 56-9.
[94] A satellite in Geosynchronous or GEO orbit lies 35,680 km (22,300 miles) above the Earth. This orbit matches the rotational motion of the Earth, allowing it to remain over the same point on the Earth. This is the orbit commonly used by communication satellites.
[95] Roger Bilstein, *Space Station Configurations and Phase-B Studies at JSC* (Houston: NASA Lyndon B. Johnson Space Center, 1988).
[96] The greater stability was due to the placing the Station's center of mass closer to the center of the complex (Philip Culbertson, Interviewed by Sylvia D. Fries (Washington: NASA Historical Collection, 1988)); John Hodge, "Shaping the Space Station: A Conversation With John Hodge," Interview by Tony Reichhardt and John Rhea. *Space World* (May 1986), 14.
[97] Bilstein, 1988; John Hodge, *A Space Station For America* (Washington: NASA, 1985).

The Challenger Accident

The destruction of the Space Shuttle *Challenger* in January 1986 immediately plunged NASA into disarray. The SSP was dramatically influenced by the loss of *Challenger* and the resultant inquiry. NASA lost one fourth of its Shuttle fleet and the remainder were immediately grounded. There was no chance of launching any Space Station elements until the Shuttle had recovered, a process that would take thirty-one months.[98] There were also political challenges, as the accident made public the bureaucratic density of NASA and suggested a program in disarray.[99] In the wake of *Challenger*, there was also a NASA leadership change as Acting Administrator William Graham, in office since December 1985, resigned. Stepping into the unenviable role was James Fletcher, a respected manager who had served as Administrator in the 1970s.[100] In response to the sense of drift, a host of panels and study groups

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[98] The STS-26 mission in September 1988.

[99] W.D. Kay, *Can Democracies Fly in Space? The Challenges of Revitalizing the US Space Program* (Westport (Connecticut): Praeger, 1995). An internal NASA document, leaked to *Aviation Week*, suggested that NASA, especially the Astronaut office and Space Station Program were beset by poor morale and a sense that NASA had lost its way (Craig Couvault, "Launch Capacity, EVA Concerns Force Space Station Redesign," *Aviation Week and Space Technology* (21 July 1986).

[100] NASA, "Fletcher Begins Second Term as NASA Administrator," (Washington: NASA, 1986). James Beggs had taken a leave of absence from NASA in response to a federal indictment for alleged acts committed while an executive at General Dynamics. Beggs formally resigned as Administrator on 25 February 1986. He was later exonerated by the Justice Department (NASA History Office, "James Beggs". NASA History Office [Web Page], Accessed 11 November 1997. http://www.hq.nasa.gov/office/pao/History/Biographies/beggs.html.
Philip Shenon, "NASA Chief Takes Leave to Answer Fraud Charges," *New York Times* (5 December 1985), D30..

contributed ideas on the direction of the space program in the years following the *Challenger* accident.[101]

A major impact of the accident was the complete reconsideration of safety issues for both the Shuttle and the Space Station.[102] The country had been stunned by the loss of the *Challenger* crew and the element of risk in space flight was under greater scrutiny. The major safety concern was the provision of an emergency return vehicle. This was necessitated by a realization that the Shuttle could not be guaranteed as a launch or return vehicle. Should another accident ground the Shuttle fleet, any Space Station astronauts would be stranded with no way to return to Earth. Even without a Shuttle grounding, it was desirable to give a crew the ability to exit the Station in an emergency, due to the time required to prepare a shuttle for launch. Several options were explored over the following years. ESA proposed the *Hermes* shuttle (then still under development) as a crew return vehicle in 1992. However, NASA was not receptive; the *Hermes* program was eventually scaled back and ultimately canceled.[103] A surprising alternative that NASA considered in the early 1990s was the Soviet-Russian *Soyuz* vehicle. A modified version was eventually adopted as an interim crew return vehicle, to be used until an

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[101] Theresa M. Foley, "NASA Emphasis on Shuttle, Station to Continue Under New Goals," *Aviation Week and Space Technology* (8 December 1986).
[102] Philip Culbertson, "Memo From Philip Culbertson to John Hodge. STS 51-L Impact to the Space Station" (Washington: NASA Historical Collection, 1986).
[103] Jeffrey M. Lenorovitz, "Crew Rescue Vehicle for Space Station Studied as Alternative to Hermes Program," *Aviation Week and Space Technology* (25 May 1992); "ESA Formulates Proposal For Scaled-Down Space Plan," *Aviation Week and Space Technology* (1 June 1992);

American vehicle was developed.[104] The Station would not be rated for crew occupancy unless a crew return vehicle was in place.

Another safety consideration was the amount of extra-vehicular activity (EVA), or space walks, needed to build the Station. The EVA issue arose from the design of the Station, which would require hundreds of hours of crew time in space suits for assembly and maintenance.[105] In 1990, Congress ordered NASA to redesign the Station, in part to reduce the amount of EVA time required for assembly. Nonetheless, the number of EVA hours for assembly remained high and increased dramatically in the 1990s, from 434 hours in 1993 to 1729 hours in 1997.[106]

A final outcome of the *Challenger* accident was a further redesign of the SSP. The Station was redesigned to reduce cost and to require less external maintenance.[107] A scaled-down version of the Dual Keel design, designated the Revised Base Line, was formalized in May 1986.[108] The Revised Base Line dropped the vertical boom from the initial "core" Station, but proposed adding it

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Craig Couvault, "Europe Sets $26-Billion Space Program For 1990's," *Aviation Week and Space Technology* (16 November 1992).

[104] Craig Couvault, "Mir Cosmonauts Prepare For Reentry As NASA Holds Soyuz Talks in Moscow," *Aviation Week and Space Technology* (23 March 1992); "Memorandum From the Deputy Director of Space Station Freedom Program and Operations to Johnson Space Center Space Station Projects and Director Space Shuttle Operations" (Washington: NASA Historical Collection, 1993); NASA, *Cost Report For Space Station Alpha* (Washington: NASA Historical Collection, 1993); NASA. *International Space Station Fact Book* (Washington: NASA, 1995).

[105] Interview With Richard Truly, 4 September 1998; Craig Couvault, "Launch Capacity, EVA Concerns Force Space Station Redesign," *Aviation Week and Space Technology* (21 July 1986).

[106] Marcia Smith, *Space Stations* (Washington: Congressional Research Service, 1999), 5.

[107] Craig Couvault and Theresa M. Foley, "NASA Station Design Focuses on Assembly, Early Activation," *Aviation Week and Space Technology* (22 September 1986).

at a later date. Peripheral components, including the OTV and OMV were canceled. The Station was now smaller than previous plans: 108 meters (353 feet) long with 650 cubic meters (23,000 cubic feet) of pressurized volume.[109] This design model stabilized the broad outlines of the Station's architecture although the exact size, available power, and assembly schedule were still not fixed.

"A New Bridge Between the Worlds"

As the Reagan Administration gave way to the Bush Presidency in 1989, the SSP, now named *Freedom*,[110] was five years old. However, no hardware had been built or placed in orbit. The SSP survived continued political perils and technical difficulties. Despite the problems, George Bush remained generally supportive of the space program, calling for a mission to Mars and endorsing *Freedom* as a "new bridge between the worlds." Bush also attempted to give NASA a broader long-term mission through an ambitious program of Lunar and Mars exploration. This resurrected von Braun program, named the Space Exploration Initiative (SEI) was unveiled at the ceremonies

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[108] NASA, "NASA Announces Baseline Configuration For Space Station" (Washington: NASA, 1986).
[109] NASA, *Space Station Freedom User's Guide* (Washington: NASA Historical Collection, 1992), 2.2.
[110] White House, "Statement by Marlin Fitzwater, Assistant to the President for Press Relations" (Washington: NASA Historical Collection, 1988).

commemorating the 20th anniversary of the *Apollo 11* mission at the Smithsonian Air and Space Museum.[111]

The SEI was not new in substance, as it was built upon proposals made in the Ride report and the National Commission on Space study.[112] What was new was the presidential endorsement. The essence of the SEI was supported by the Augustine report in 1990 and the Synthesis Group study the following year.[113] These independent panels reviewed the state of NASA programs and proposed future mission plans. They agreed that NASA needed a grand agenda around which to structure its activities. Apollo provided ample evidence of the success of such a national goal. The independent panels all endorsed an integrated utilization-Solar System exploration plan as a national objective. The Space Station was also endorsed as facilitating each of these goals. However, the projected cost of the SEI was too high and Congress did not endorse or fund the project.[114] Therefore, NASA did not receive a new mandate on the scale of Apollo. The Space Station had to be justified on its own merits.

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[111] George Bush, "Remarks on the 20th Anniversary of the *Apollo 11* Moon Landing, July 20 1989" In *Public Papers of the Presidents of the United States: George Bush 1989. Book II, July 1 to December 31, 1989* (Washington: U.S. Government Printing Office, 1990), 990-93.

[112] National Commission on Space, *Pioneering the Space Frontier* (New York: Bantam Books, 1986); Sally Ride, *Leadership and America's Future in Space: A Report to the Administrator* (Washington: NASA, 1987).

[113] The Synthesis Group was an inter-agency group representing NASA, DoD, the Departments of Energy and Transportation, and private industry (Craig Couvault, "Exploration Initiative Work Quickens As Some Lunar Concepts Avoid Station," *Aviation Week and Space Technology* (17 September 1990); Craig Couvault, "Synthesis Group to Urge Rapid Lunar/Mars Pace, Support for Station Role," *Aviation Week and Space Technology* (3 June 1991).

[114] James A. Vedda, "Evolution of Executive Branch Space Policy Making," *Space Policy* (August 1996).

Despite this, the Space Station survived, although it underwent further redesigns. The redesigns remained primarily American affairs and the partners were not always closely consulted. In 1989, one such redesign effort, became a particular point of controversy between NASA and the partners. This was the "Langley Redesign", named for the NASA Langley Research Center in Virginia. This design attempted to reduce cost and maintain as much Station capabilities as possible, but delayed the launch of the ESA and Japanese modules and cut the amount of power available to Station users.[115] The international partners were angered by the changes, their lack of input, and the fact that their own program costs were affected.[116] ESA's Director General, Reimar Lüst, complained to a Congressional panel the following January that, "I was informed of the [Langley] exercise a week after it was begun and merely 'debriefed' when it was over."[117] Although later redesigns did have partner participation, the ill-will produced by unilateral US decisions lingered into the following years.

NASA also faced managerial changes during the Bush years. James Fletcher, who oversaw the Agency's post-*Challenger* recovery, left with the

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[115] Logsdon, 1991. Station users were to be allocated 30kW of power under the Langley design, a reduction from 45kW in earlier plans. The remainder of the Stations 75kW was reserved for "housekeeping" (James Asker, "Japanese and Europeans Irked By Latest Space Station Changes," *Aviation Week and Space Technology* (6 November 1989).
[116] James Asker, "NASA Offers to Advance ESA, Japanese Station Modules; Congress Airs Concerns," *Aviation Week and Space Technology* (5 February 1990), 38-9; Criag Couvault, "NASA Accelerates Lunar Base Planning As Station Changes Draw European Fire," *Aviation Week and Space Technology* (18 September 1989), 26-7.
[117] US Congress, House of Representatives, Committee on Science Space and Technology, *Space Station International Partners* (Washington: Government Printing Office, 1990). 8.

Reagan Administration. Former astronaut Richard Truly became NASA Administrator and attempted what may be regarded as a holding action to keep the SSP alive while its political support wavered. Overall, US space policy was in flux, caught between NASA management and a more commercially oriented National Space Council led by Vice President Dan Quayle.[118] The Council sought changes to the NASA management system, including reduction of administrative layers and greater speed in project development. Truly was regarded by Quayle as resisting these changes and in February 1992, was asked to resign by Bush at Quayle's urging. Truly's successor, Daniel Goldin, a former executive at TRW, was both new to Washington and to the space program, but he willingly embraced the new management philosophy.[119]

New opportunities appeared as well. The fall of the USSR in 1991 provided an opportunity to change the tone of the superpower relationship. More fundamentally, the dramatic changes of 1989-1991 had removed what had been the guiding principle of US foreign policy for nearly fifty years. The resulting change in US foreign policy needs was reflected in the US space program; the "Cold War paradigm" of space policy was increasingly non-viable

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[118] Joan Johnson-Freese and Roger Handberg, *Space, The Dormant Frontier: Changing the Paradigm for the 21st Century* (Westport (Connecticut): Praeger, 1998), 104, 111-12.
[119] Craig Couvault, "White House to Restructure Space Program; Truly Fired," *Aviation Week and Space Technology* (17 February 1992), 18-9; Craig Couvault, "Nominee For NASA Chief Fits Space Council Approach," *Aviation Week and Space Technology* (16 March 1992), 21. The new philosophy was known as "faster-better-cheaper" and has guided NASA management and policy since 1992. The basic principle of "faster-better-cheaper" has been to emphasize rapid project development and deployment, accepting occasional higher risk.

as a political strategy.[120] Whereas only limited cooperation had been possible before, the superpowers embraced greater collaboration in agreements signed in July 1991 and June 1992. These agreements were the genesis of a new relationship, and a new SSP.[121]

Opposition, 1985 to 1992

Post-*Challenger* NASA faced greater scrutiny from the public, media, and political leaders than it had ever experienced. Independent commissions and the media alike pointed to the agency's managerial and technological failures as well as a lack of purpose and direction in the civil space program.[122] Despite these travails, Presidents Reagan and Bush remained supporters, as did key Congressional actors. Although often critical, the special commissions all gave support to the space station as necessary for future piloted space exploration. Indeed, the panel reports spoke of a need for more space activities, not less.

There were still serious opponents of the SSP. There was a great deal of ambivalence, even hostility, from the Pentagon. One official claimed that during negotiations with the international partners in 1985, DoD pressed the issue of technology transfer to undermine international cooperation in hopes of killing

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120 Johnson-Freese and Handberg 1998.

121 Craig Couvault, "U.S.-Soviet Pact Backs New Joint Manned Space Flights," *Aviation Week and Space Technology* (5 August 1991), 18-9.

122 Marcia Smith, "Lessons Unlearned: Space Policy After *Challenger*," *Space World* (October 1987), 21-3.

the project. DoD representatives attempted to impose extremely strict technology transfer requirements and limits on communications links between the US and its potential partners to discourage the partners from signing.[123]

There was hostility from the scientific community as well. Prominent scientists such as James Van Allen actively opposed the SSP, fearing that another huge human space flight program would swallow the NASA budget, much as they perceived the Shuttle as doing a decade before. Opposition from the scientific community remained constant throughout the Station project, as Van Allen, Bruce Murray and Carl Sagan of the Planetary Society, and even some NASA scientists questioned the value of the ISS, its proposed missions, its design, or its cost.[124] Political opposition, high cost, and a lack of exiting missions put the SSP in a very precarious position as the United States entered the 1992 election season.

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[123] Confidential Interview With Author. Suspicion about the motives of the DoD was not limited to NASA. An internal NASA memo dated 13 February 1987 cited concerns from the Congressional staff. House staffer Dick Marlow was worried that the DoD was using allied concern over the SDI project to drive the partners away from the Space Station negotiations John Madison, "Memorandum For the Record. Meeting With Senate and House Staff on the HUD-Independent Agencies Subcommittee, February 10, 1987" (Washington: NASA Historical Collection, 1987), 4.

[124] Theresa M. Foley, "Scientists Warn NASA of Threats to Space Station Usefulness," *Aviation Week and Space Technology* (24 November 1986), 18-9. Former NASA Historian Alex Roland also became a vocal critic of the Space Station (Alex Roland, "We Shouldn't Build the Space Station Now," *Technology Review* (July 1987), 22-3; Alex Roland, "Cost in Space: How

A "Unified Space Station"

The newly elected Administration of William Clinton inherited an unpopular *Freedom* program from its Republican predecessors. Although both Clinton and Vice President Albert Gore had endorsed the Station during the campaign, continuation of the project was not certain.[125] Clinton retained Bush appointee Daniel Goldin as Administrator, which provided some continuity across administrations. However, Congressional support was weak in 1993, particularly in June when the Station survived a floor vote in the House 216 to 215.[126] At this nadir of Space Station fortunes, two near-simultaneous decisions dramatically changed the Space Station Project: the Alpha redesign decision and the invitation to Russia to join the project. It is during this period that the Station project took its current shape and became the International Space Station. After ten years, the Space Station's purpose had been transformed, in the same way that US foreign policy had been: from a means to battle the Soviets for prestige and technological superiority, to a means to forge a peaceful new world order. The Space Station Project was the flagship of policy changes and a centerpiece of the new US-Russian relationship. The project underwent a final metamorphosis from a domestic program with foreign

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Promoters of the Megabuck Space Station and Shuttle Knock Real Science Out of Orbit," *Washington Post* (22 May 1994), C1-2.

[125] James Asker and Jeffrey M. Lenorovitz, "Station Struggles With New Cost Woes," *Aviation Week and Space Technology* (8 February 1993).

participation to a foreign policy program. The meaning, purpose, and tone of the project changed completely in 1993; in a sense, the Station was given a political rationale diametrically opposed to its original purpose.[127] The *raison d'être* of the Space Station would now be US-Russian cooperation.

The Alpha Option

The Station was still controversial and many called for the new Administration to cancel it. Clinton, aware of the Station's importance to the troubled aerospace industry, chose to continue the project.[128] In February 1993 Clinton ordered NASA to redesign the Station's architecture and plans by June.[129] An independent group under the direction of M.I.T. President Charles Vest, was tasked to review the NASA work.[130] The focus of the redesign was to be cost reduction, earlier habitation, reduced EVA time, and maximum use of *Freedom* hardware. The international partners were concerned about this latest redesign, for it took several months for the redesign team to issue its report. During the redesign period, the SSP was on hold.[131]

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[126] James Asker, "NASA's Space Station Dodges Another Bullet," *Aviation Week and Space Technology* (28 June 1993), 23-4.
[127] Interview With Diana Hoyt, 28 May 1998.
[128] "Clinton Orders New Design For Space Station," *Aviation Week and Space Technology* (22 February 1983), 20-1.
[129] Daniel Goldin, "Redesign Process," (Washington: NASA Historical Collection, 1993), 1.
[130] Advisory Committee on the Redesign of the Space Station, *Final Report to the President* (Washington: The Committee, 1993), 1.
[131] James Asker, "NASA Struggles With Station Redesign," *Aviation Week and Space Technology* (12 April 1993), 24-5; Craig Couvault, "Global Space Alliances Shift With Station Crisis," *Aviation Week and Space Technology* (29 March 1993), 22-3; Eiichiro Sekigawa, "Japan Committed to Space Station," *Aviation Week and Space Technology* (5 April 1993), 59; James

The redesign study offered options ranging from a modified *Freedom* design to a single launch module.[132] The first, Option A, was a scaled back version of *Freedom* with the addition of some Russian hardware to save money and accelerate deployment. Option B was the closest to the *Freedom* design, having the fewest changes. The third option, described as the "Big Can," was a single module with the partner's labs added at a later date.[133] The Vest Committee recommended Option A while the partners expressed their opposition to Option C.[134] Clinton choose Option A in June 1993.[135] The revised Station project, referred to as "Alpha" from Option A, was presented as a lower cost plan that would fulfill the same missions as the Dual Keel.[136] As the redesign took shape, the idea of using Russian space hardware to complete the Station emerged.[137] NASA proposed purchasing some Russian hardware, including a service module known as the Functional Cargo Block (Russian acronym FGB) and two *Soyuz* crew return spacecraft.[138]

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[132] "Redesign Team Presents Viable Options; Achieves Significant Savings- Goldin," *Station Break* (June 1993), 3.
[133] Andrew Lawler, "Details of Redesign Team Findings Sent to White House," *Space News* (June 1993), 20; "Redesign Team Presents Viable Options...," 1, 3-5.
[134] Sawyer 1993, A4; Lawler 1993, 29.
[135] William Clinton, "Statement of the President," (Washington: NASA Historical Collection, 1993).
[136] The new Space Station was also tied to the Clinton Administration's government reform program White House, Office of the Press Secretary, "Space Station Redesign Decision Reduces Costs, Preserves Research, Ensures Int'l Cooperation," (Washington: NASA Historical Collection, 1993).
[137] James Asker, "Goldin Rallies Support For Redesign," *Aviation Week and Space Technology* (10 May 1993), 28-9; Jeffrey M. Lenorovitz, "Russia Cost Estimates Due On U.S. Station Modules," *Aviation Week and Space Technology* (17 May 1993), 33-4.

The Invitation to Russia

The Alpha redesign concept was quickly absorbed into a new proposal to invite Russia into the project. The Gore-Chernomyrdin Commission was the forum where initial negotiations took place in August-September 1993. The new initiatives had built on the warming relationship between the superpowers that emerged in the Bush Administration and the need to give the SSP a new direction. The result of the negotiations was a solid agreement to expand US-Russian space cooperation, and a preliminary agreement to merge Russia into a "unified space station" project.[139] Russian space officials first met with all the participating countries in November leading to the formal invitation to Russia to join the SSP in December 1993.[140]

The idea of including Russia was not new. In the early days of the *Freedom* project, NASA considered several joint space projects with Russia. Hans Mark had suggested having a cosmonaut fly on a Space Shuttle, and James Beggs had even suggested that Russia be brought into the Space Station Project. However, these ideas were politically premature and were vetoed by "cold warriors" in the Reagan Administration.[141] The Soviets also had

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[138] James Asker, "NASA Details New Station Plans," *Aviation Week and Space Technology* (13 September 1993), 20-1.
[139] United States-Russian Joint Commission on Energy and Space, "Joint Statement on Cooperation in Space," (Washington: White House, Office of the Vice President, 1993).
[140] "Joint Invitation at the Occasion of the Intergovernmental Meeting of the Space Station Partners," (Washington: NASA Historical Collection, 1993); NASA, "Space Station Heads of Agencies Meeting, Montreal, Canada," (Washington: NASA, 1993).
[141] Interview With Hans Mark, 23 January 1998; Interview With James Beggs, 22 July 1999. After speaking for a few moments about inviting Russia into the project in the early 1980s,

linked such cooperation to the abandonment of the Strategic Defense Initiative program, guaranteeing a US rejection.[142]

By 1993, the Cold War was fading into nostalgia, and a new, uncertain, US-Russian relationship was being forged. The SSP was begun anew with Russia and the *Freedom* project was unofficially ended, although the name *Freedom* lingered for a time. The first part of the project, now dubbed the *International* Space Station, would be a period of joint missions, allowing the US and Russian space agencies an opportunity to work together and interface their planning, training, and operations systems. This period of integration and mutual learning became known as "Phase I" and the Shuttle-*Mir* program. Between 1994-1997, six astronauts flew extended missions on the *Mir* and several cosmonauts flew on American Shuttles to and from *Mir*.[143]

The Shuttle-*Mir* project was dramatic and controversial, for the Russian space station was dogged by danger. An on-board fire, a near collision by a supply ship, and an actual collision by a similar craft, shook Western confidence in the Russian space program.[144] The aging *Mir* required more maintenance than Russia had been willing to admit and this degraded the

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Beggs commented "maybe it was not a good idea. We were still mad at the Russians then, with good reason."

[142] David Portree, *Thirty Years Together: A Chronology of US-Soviet Space Cooperation* (Houston: NASA Johnson Space Center, Management Services Division, 1993), 28.

[143] Roberta Gross, "Letter From Roberta L. Gross, NASA Inspector General to F. James Sensenbrenner," (Washington: NASA Science and Technology Library, 1997); NASA, *NASA Pocket Statistics* (Washington: NASA, Headquarters Facilities and Logistics Management, 1997).

[144] Marcia Smith, *U.S.-Russian Space Cooperation: The Shuttle-Mir Program* (Washington: Congressional Research Service, 1997), 2-4.

scientific value of the American tours on *Mir*. On the positive side, this experience allowed NASA to discover the complexity and risks involved in long-range space flight. The minor and major crises on *Mir* forced NASA to face the issues of long-term space flight that it had not before.[145] Despite the problems, the Shuttle-*Mir* program was completed and work began on the ISS-proper.

Issues in Russian Participation

In practical terms the Russians had gained considerable expertise in long-duration space flight from their *Salyut* and *Mir* programs. Russia had an existing resupply/refueling system for *Mir* and an alternative launch system, both of which would ease SSP operations. NASA hoped to take advantage of that knowledge. There were also political advantages in Russian involvement. Russian cooperation could spread out the total cost and reduce the total US cost.[146] The new design was larger than the Alpha option and projected to be completed sooner. Most appealingly, the "Alpha plus Russia" design would be usable by crews earlier than Alpha alone.[147]

There were also costs to this new arrangement. NASA had to change the Station's orbital inclination from 28.8° to 51.6° to make it more accessible to Russian launch sites. This increased launch costs for the US, as it required

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[145] Interview With Michael Hawes, 27 July 1999.
[146] Interview With Lynn Cline, 9 July 1999; US Congress, House of Representatives, Committee on Science, Space, and Technology, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2* (Washington: Government Printing Office, 1993).
[147] Smith 1999); Interview With Peter Ahlf, 26 July 1999.

more fuel to put the Shuttle into such an orbit. The result was the Shuttle could carry 5,400 kg (12,000 pounds) less cargo to the ISS, although improved external tanks reduced this cost somewhat.[148]

The participation of Russia did provide a new political rationale for the Space Station. One of the most important arguments raised was both novel and, considering the history of the space age, ironic. Cooperation in space would promote democracy in Russia by engaging the "defense industry complex of Russia in civil cooperation."[149] Most specifically, it would also help to ensure Russian compliance with the Missile Technology Control Regime (MTCR) and provide employment for thousands of Russian space technicians and scientists who might otherwise sell their skills to weapon-hungry Third World states.[150] To demonstrate their acceptance of the MTCR, Russia modified a contract with India for missile technology, an agreement that the US had opposed. This modification cost Russia approximately $400 million. In an unacknowledged *quid pro quo*, the US agreed to pay that same amount to

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148 James Asker, "New Station Plan Unveiled; Russia Vows to Contribute," *Aviation Week and Space Technology* (8 November 1993); NASA Advisory Committee, *Report of the Cost Assessment and Validation Task Force on the International Space Station* (Washington: NASA, 1998).

149 James Collins, Senior Coordinator, Office of the Ambassador at Large For New Independent States in US Congress, House of Representatives, Committee on Science, Space, and Technology, *1995 NASA Authorization (Space Station: Parts 1 and 2)* (Washington: Government Printing Office, 1994). See also US Congress, House of Representatives, Committee on Science, Space, and Technology, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2* (Washington: Government Printing Office, 1993).

150 US Congress, House of Representatives, Committee on Science, Space, and Technology, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2* (Washington: Government Printing Office, 1993); US Congress, House of Representatives, Committee on Science, Space, and Technology, *1995 NASA Authorization (Space Station: Parts 1 and 2)* (Washington: Government Printing Office, 1994).

Russia as compensation for the Shuttle-*Mir* program. The funds were transferred directly from government to government, an unusual procedure in itself; in previous cooperative agreements, NASA had followed a "no exchange of funds" rule.[151] The intent was to "feed [the Russians] cash" to keep Russia's high technology sector alive and geared towards peaceful pursuits.[152]

Renegotiating the Agreements

An Interim Agreement signed in June 1994 between NASA and the Russian Space Agency foresaw the integration of Russia to the greatest extent possible into the existing (1988) agreements.[153] However, Russia was a special case in cooperation, as it was providing more hardware and had greater experience in space than the other partners. That, along with certain political considerations, required that new agreements be negotiated between all of the partners. A new IGA and four MOUs were negotiated over a three-year period starting in 1994 (see Figure 5.7).[154]

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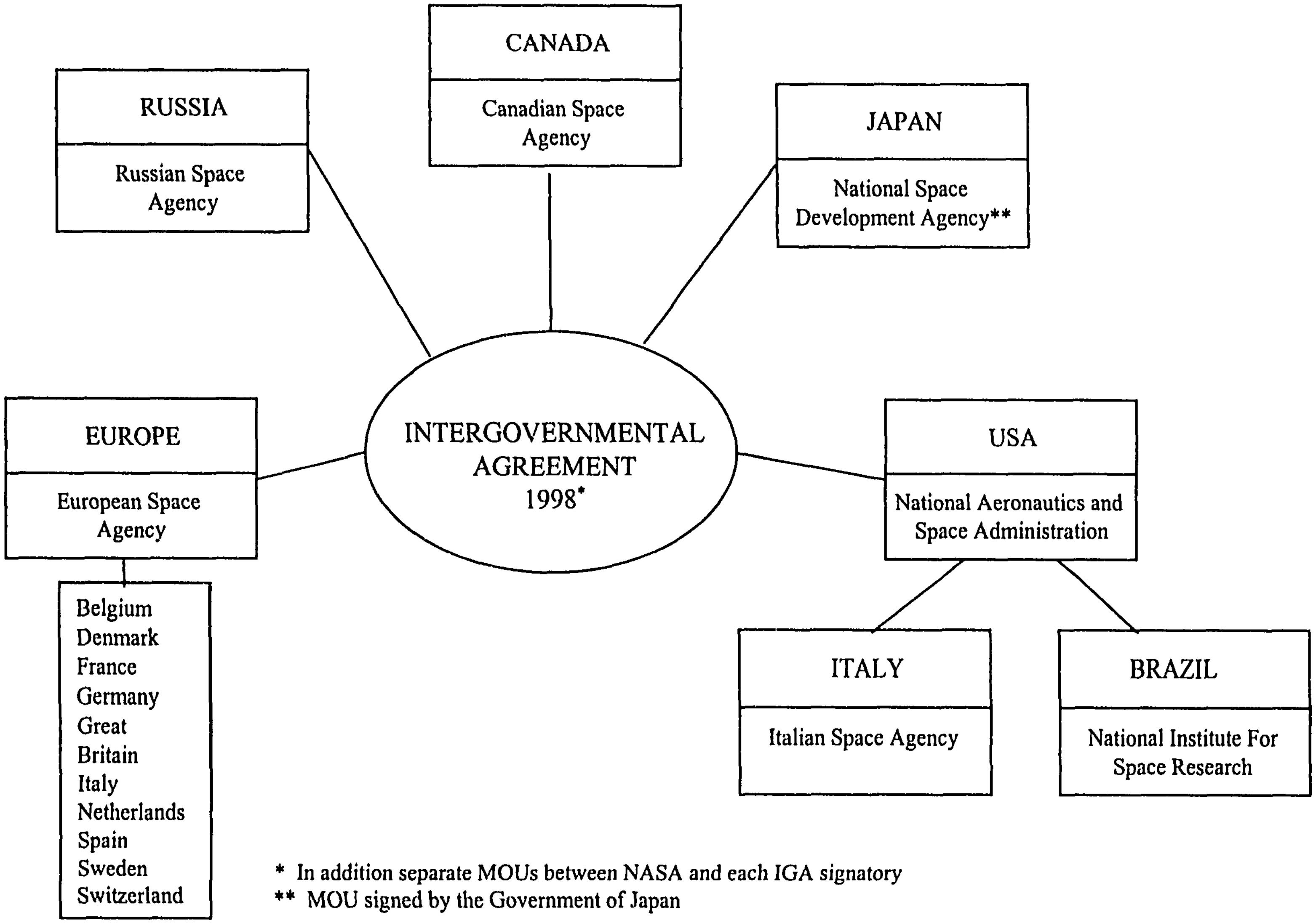
[151] Williamson noted that this model had been employed in the *Spacelab*, Canadarm, and previous SSP agreements (Ray Williamson, "International Cooperation and Competition in Civilian Space Activities," *Space Policy* (November 1985), 409-14.

[152] Confidential Interviews With Author.

[153] "Interim Agreement Between the National Aeronautics and Space Administration of the United States of America and the Russia Space Agency For the Conduct of Activities Leading to Russian Partnership in the Detailed Design, Development, Operation and Utilization of the Permanently Manned Civil Space Station," 23 June 1994 (Washington: NASA Historical Collection, 1994).

[154] *Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, Government of the United States of America Concerning Cooperation in the Civil International Space Station* (Washington: NASA, 1998). Hereafter 1998 IGA.
Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the Government of Japan Concerning Cooperation on the Civil

Figure 5.7. INTERNATIONAL SPACE STATION AGREEMENTS, 1998
Participating Countries and Agencies



* In addition separate MOUs between NASA and each IGA signatory
** MOU signed by the Government of Japan

The negotiations with Russia occurred in a two-stage process. The US and the original partners negotiated with each other and then the US would represent the entire group in direct talks with Russia. Each space agency needed to obtain approval from their national governments as well. In the case of the US, this meant constant consultations with the State and Defense Departments as well as the White House.[155] Before the US could propose a change in the agreement to Russia, it had to clear that proposal with the original partners.[156]

Status was an important consideration. Russia sought equality with the US and a higher status than the original partners.[157] The primary concerns of the original partners were the desire to maintain their existing access to the Station and not to be reduced to minor players in a project dominated by the US and Russia. The ESA governments, in particular, were angered that the US

International Space Station. NASA [Web Page], Accessed 17 February 1999. ftp://ftp.hq.nasa.gov/pub/pao/reorts/1998/nasa_japan.html. Hereafter NASA-GOJ 1998. *Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the European Space Agency Concerning Cooperation on the Civil International Space Station*. NASA [Web Page], Accessed 17 February 1999. ftp://ftp.hq.nasa.gov/pub/pao/reorts/1998/nasa_esa.html. Hereafter NASA-ESA 1998. *Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the Russian Space Agency Concerning Cooperation on the Civil International Space Station*. NASA [Web Page], Accessed 17 February 1999. ftp://ftp.hq.nasa.gov/pub/pao/reorts/1998/nasa_russian.html. Hereafter NASA-RSA 1998. *Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the Canadian Space Agency Concerning Cooperation on the Civil International Space Station*. NASA [Web Page], Accessed 17 February 1999. ftp://ftp.hq.nasa.gov/pub/pao/reorts/1998/nasa_csa.html. Hereafter NASA-CSA 1998. Separate bilateral MOUs have been signed between NASA and the Italian and Brazilian space agencies. These agreements are independent of the 1998 IGA-MOU agreements. Brazil is not an official ISS partner, as it did not sign the 1998 IGA.

[155] Interview With Michael Hawes, 27 July 1999.

[156] Interview With Lynn Cline, 9 July 1999.

acted to bring Russia into the project without consulting the existing partners.[158] In the negotiations, the original partners endeavored to maintain their existing position vis-à-vis the US.

There were three major issues that needed to be resolved in the new negotiations. Legal jurisdiction over Station modules and any possible criminal activity had to be adjusted from the 1988 agreements. While NASA was still the lead agency, Russia had greater autonomy in space operations than any of the other international partners. Under the previous agreements, criminal jurisdiction was based on the nationality principle; each country enjoyed criminal jurisdiction over their nationals and Space Station modules. The US however, maintained an overall jurisdiction when Station or crew safety was deemed to be in danger.[159] The fact that the US had the only means available to exit the Space Station (the Shuttle, which would land on US territory) gave it de facto possession of any alleged criminal. With the addition of Russia, the prospect of separate return vehicles returning to separate countries posed a potential problem. A worst-case scenario was an American astronaut accused of a crime in the Russian module being forced by circumstance to return via a Russian *Soyuz* to the Russian landing site in Kazakhstan, which was not a SSP

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[157] Interview With Peter Ahlf, 26 July 1999; Interview With Lynn Cline, 9 July 1999.
[158] W. Albright, "Space Station Partnership Intergovernmental Consultative Meeting, Paris, October 16, 1993. Political/Economic Perspectives-- ESA Members," In *Bob Clarke Code I (Notebooks): Meetings With Japan/Canada/Russia/ESA 1993* (Washington: NASA Historical Collection, 1993), No Pg.
[159] 1988 IGA, Article 22.2.

partner.[160] A stricter form of the nationality principle was therefore adopted. Each partner state had jurisdiction over their nationals, wherever they were in the Station. However, should a partner be unsatisfied with proceedings, a government whose module or national was victimized could seek extradition of an alleged criminal.[161]

A second major issue was access and use of the Station. This was not greatly changed by Russian participation. Russia sought and obtained full use of its own contributions (labs and power) under a "keep what you bring" formula, while the original sharing formulas from the 1988 agreements were continued with minor alterations for the rest of the Station.[162] ESA and Japan's percentages remained unchanged (see figure 5.3). Canada was unsuccessful in obtaining a percentage of the Russian labs because the RMS was unable to reach the Russian "side" of the ISS.[163] In addition, because Canada canceled one of its contributions, the Special Purpose Dexterous Manipulator, its share of the non-Russian laboratories was reduced to 2.3%.[164] The percentage of

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[160] The Baikonur Cosmodrome is used by Russia under lease from Kazakhstan. The facility is designated Russian territory but is administered "with due regard" for Kazakh law (Lynn Cline, "Baikonur Agreement," In *Bob Clarke Code I (Notebooks). Meetings With Russia (1994)* (Washington: NASA Historical Collection, 1994).
[161] Lynn Cline, Interview by Author, 9 July 1999; 1998 IGA, Article 22.2 and 22-3.
[162] Interview With Peter Ahlf, 26 July 1999.
[163] Lynn Cline, Interview by Author, 9 July 1999.
[164] Lynn Cline and Graham Gibbs, "Re-Negotiation of the International Space Station Agreements- 1993 to 1997" (Paris (France): International Astronautical Federation, 1997).

crew time was also worked out based on a formula to be satisfied over time (i.e. not in every single or any particular mission).[165]

The third issue that needed to be addressed was the military uses of the Station. The US still sought to preserve the right of the Defense Department to use the ISS, should it desire. The DoD position had not changed in the 1990s and no defense uses of the ISS were planned. However, US negotiators were directed to maintain the right of military use. The issue was resolved by use in the agreements of the phrase "peaceful purposes," a term used in previous space treaties. The term was vague, generally excluding the use or testing of weapons but allowing reconnaissance and other military activities. This terminology satisfied ESA and Japan, as each opposed weapon testing on the station. Each partner retained a veto over DoD uses of their labs based on their own definition of "peaceful purposes." Russia had the same right as the US in its own laboratory modules.[166]

Opposition, 1992 and After

The change from *Freedom* to the ISS generated controversy and redrew the issue boundary of the Space Station debate. Some key Station foes became supporters now that the Station had a clearer political rationale.[167] John

[165] Lynn Cline, *The International Space Station Partnership* (Washington: NASA Historical Collection, 1998), 10.
[166] Lynn Cline, Interview by Author, 9 July 1999.
[167] James Asker, "Russian Role Key in Station Debate," *Aviation Week and Space Technology* (27 September 1993), 22-3.

Pike, a long-time critic of the Station, began to support it because of the political relationship with Russia, although he still regards the Station scientific value to be "trivial."[168] At the same time, some erstwhile Station supporters such as Congressmen George Brown (D-CA) and James Sensenbrenner (R-WI) were less enthusiastic about Russian involvement. Congressional opinion was volatile, reflecting both fears of Russia and domestic political divides.[169] Some feared that sharing work (and launch vehicles) with Russia could cost US jobs, particularly in the aerospace industry.[170]

Russian political instability was not reassuring to Station opponents, and some supporters. For some, the Russian political transition was an additional reason to cancel the Station. In a floor debate, Senator Dale Bumpers (D-AK) cited Russian President Yeltsin's surprise calling of early elections and rhetorically asked, "In light of [Russian instability], does the distinguished chairman still think that this is a great idea, to get in bed with Russia on this?"[171]

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[168] Interview With John Pike, 16 July 1999.

[169] Congressman Ralph Hall (D-TX), when interviewed in 1998 was unsure if the decision to bring Russia into the project should be "criticized or lauded" (Interview With Ralph Hall, 3 June 1998). Sensenbrenner has been highly critical of the Russian role in the SSP. However, a Congressional staffer noted that despite the traditional nonpartisan nature of space policy in Congress, Sensenbrenner on occasion used the Russian induced Station ills as a political "club against Clinton and Gore" (Confidential Interview).

[170] US Congress, House of Representatives, Committee on Science, Space, and Technology, *1995 NASA Authorization (Space Station: Parts 1 and 2)* (Washington: Government Printing Office, 1994).

[171] US Congress, Senate, Senator Dale Bumpers of Arkansas Speaking During Floor Debate on The Department of Veteran's Affairs and Housing and Urban Development Appropriations Act For Fiscal Year 1994. Library of Congress , 21 September 1993. http://rs9.loc.gov, S12087-S12088

Long-time critic Representative Dick Zimmer (R-NJ) also seized on Russian instability as an additional reason not to build the Station.[172]

The condition of the Russian space flight facilities at Baikonur, in the newly independent country of Kazakhstan, was also a concern. There was a fear of being overly dependent on Russian launch vehicles or facilities, and thus losing access to, or even control, of the Space Station.[173] Station supporter George Brown, was initially uneasy about Russia's involvement, expressing a fear that "we have turned this program over to the Russians, that they are exercising command and control over American resources."[174]

The cost of the SSP also remained an issue. A 1995 GAO report estimated that the Station would cost $94 billion to build and operate.[175] In 1998 the GAO revised that estimate to $95.6 billion.[176] The cumulative costs of the SSP (and its projected future costs) were used as justification for calls to cancel the program and "cut our losses." The opportunity costs of the Project were also an issue for some SSP critics who were otherwise supportive of NASA. Senator Bumpers noted, "Each hour of space station research will an astounding $155,000. Instead of spending $1.3 billion a year to keep four U.S.

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[172] James Asker, "Cost Cap Slow Space Station Plans," *Aviation Week and Space Technology* (28 February 1994).
[173] US Congress, House of Representatives, Committee on Science, Space, and Technology, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2* (Washington: Government Printing Office, 1993).
[174] George Brown, "Interview: Congressman George Brown, Jr. ... Space Politician," *Final Frontier* (January-February 1994), 54-6.
[175] General Accounting Office, *Space Station. Estimated Total U.S. Funding Requirements* (Washington: GAO, 1995), 2.
[176] Smith 1999, 4.

astronauts in orbit, we could fund more than 5,000 grants for research at universities and laboratories here on Earth"[177]

Conclusion: The ISS in the Context of US Space History

Recent Developments

The long saga of the Space Station Project has entered a new phase-construction. Several Space Station components are currently in orbit. The Russian-built, American-financed *Zarya* ("Sunrise," also known as the Functional Cargo Block, FGB) was launched from Baikonur on 20 November 1998. Two weeks latter Space Shuttle *Endeavour* placed the American *Unity* (Node 1) in orbit and linked it with *Zarya*. The third component, the Russian *Zvezda* ("Star") service module was launched in July 2000.[178] The first Space Station crew (one American and two Russians) was launched on 1 November 2000 to great publicity. The first crew returned to Earth in March 2001, switching places with a second Station crew. Additional flights by American and Russian vehicles have delivered hardware and supplies to the growing Station.

However, Russian financial and political crises and a series of failures of the Russian *Proton* launcher delayed the launch of *Zvezda* for two years. As it

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[177] Dales Bumpers, "Space Station Starves NASA's Best Work," *Aviation Week and Space Technology* (10 August, 1998), 106. Bumpers' reference to $1.3 billion a year reflects NASA's own estimation of the annual operating cost of the ISS (Marcia Smith, *Space Stations* (Washington: Congressional Research Service, 2000), 13.

provides electric power, attitude control, and orbital boosting, additional SSP units could not be launched until *Zvezda* was attached to *Zarya-Unity*. Other problems linked to Russia shadow the program. The Russian Space Agency proved reluctant to part with *Mir*. The aging station remained in orbit in search of private sponsors for many months before the Russian government finally abandoned it. *Mir* ended its long career in March 2001, re-entering the atmosphere. The long delay in abandoning *Mir* and the fruitless quest for private sponsors to keep it active prompted concerns about the diversion of funds from the SSP.[179] Russian safety standards are still a worry.[180] As insurance against mission-threatening Russian delays, NASA authorized the development of a substitute for *Zvezda*.[181] Finally, two Proton rockets, the same type used to launch *Zvezda*, failed during launch in 1999.[182]

Another challenge facing the ISS is the debate over its total cost, which the American media now routinely cites as $100 billion. The Chabrow Report in April 1998 warned of further delays to the Russian contribution and estimated

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[178] CNN, "Key Module Heads For Rendezvous With Space Station" [On- Line Version], 12 July 2000, http://www.cnn.com.
[179] Richard Stenger, "New Mission Planned to Mir as Current One Wraps Up," CNN [On Line Version], 12 June 2000, http://www.cnn.com; Simon Saradzhyan, "Revival of Mir Sparks Concern About ISS Commitments," *Space News* (17 April 2000), 26.
[180] General Accounting Office, *Space Station. Russian Compliance With Safety Requirements. Testimony Before the Subcommittee on Space and Aeronautics, Committee on Science, House of Representatives*, (Washington: GAO, 2000).
[181] Warren Leary, "Space Station is Assembled, But Only on the Ground," *New York Times* (28 April 1998).
[182] Miles O'Brien, "Earthly Woes Mount For International Space Station," CNN [On-Line Version], 29 May 2000, http://www.cnn.com.

an additional $130-250 million in cost overruns per year.[183] As a result of the delays, many of the stated benefits of Russian participation have "evaporated," according to official.[184] The Russian-induced delays have inspired vocal criticism from some members of Congress, especially James Sensenbrenner who became chair of the House Science Committee in 1995.[185] There are still annual votes in Congress to cancel the Station.[186] The primary challenge lies in the fact that there is no "off ramp" for the US to take in case Russia abandons the project.[187]

The "Flagship of American Power"

The ISS project, now comprising elements from 16 different countries, was re-launched (figuratively) in 1994 with its new missions of economic growth and political cooperation. The deployment of the first modules produced a cacophony of praise and awe from many in the space community. However, the joy was not universal and even among ISS supporters, the role of Russia is still contentious. Moreover, despite its name, the International Space Station is

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[183] NASA Advisory Committee, *Report of the Cost Assessment and Validation Task Force on the International Space Station* (Washington: NASA, 1998).
[184] Confidential Interview. Many officials interviewed expressed concerns about the continuing role of Russia and whether it will ultimately aid or harm the ISS.
[185] James Sensenbrenner, "Forging New Partnerships, Integrating New Architectures. Address to the National Space Forum" House Science Committee [Web Page], 5 June 1997 [Accessed 2 February 1999]. www.house.gov/science/sensenbrenner_6-5.html, 3;
James Sensenbrenner, "Address to Global Air and Space '97 Conference," House Science Committee [Web Page], 7 May 1997 [Accessed 2 February 1999]. www.house.gov/science/sensenbrenner_5-7.html.
[186] Interview With Dan Hedin, 27 July 1999.
[187] Interview With Marcia Smith, 10 June 1998.

primarily an American project, even with substantial Russian participation. The US is still legally and in practice the senior and "managing partner."[188] Russian actions have a major role in the ISS, but the US remains the central actor. In the design and development of the Station, American interests have been paramount. The decision to build the Station came from the US government; its ultimate fate will be decided by the US government acting largely alone. The rationales presented for the project, even international cooperation, have been couched in terms of US national interests.

Ultimately, the Station remains a "flagship of American power."[189] Two statements, twenty-five years apart, reveal a consistent theme that runs through the space station concept: national power and the ability to shape the nation's future. In 1969, a NASA internal study stated the following of its space station plan: "[Our] goals are to assure national competence and eminence in space that will contribute significantly to our nation's ability to define and control its own destiny."[190] In 1994, Administrator Goldin also described the Space Station as a contribution to national power, declaring it to be "a priceless opportunity to equip America for the 21st century with what may turn out to be humanity's greatest resource, the benefits and riches of space."[191] The SSP is deeply imbedded in the political-discursive environment that has dominated the

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[188] Logsdon 1991.
[189] Interview With Marcia Smith, 10 June 1998.
[190] NASA, *Statement of Work: Space Station Program Definition (Phase B). Fifth Consolidated Draft* (NASA Historical Collection, 1969).
[191] US Congress, *1995 NASA Authorization...*, 39.

US space program since 1957. The dominant factors in that environment have been foreign policy interests, domestic economics, and political symbolism. This is a volatile mix of potentially conflicting interests and actors, and no space project has ever been fully immune to contradictory pressures.

The SSP at present has been particularly sensitive to these pressures, largely because it has lacked widespread support among the policy elite or the public. There has never been a stable consensus in favor of the SSP and the project has faced severe opposition. Nonetheless, support for the SSP does exist and the project appeals to several different interests and members of both major political parties. However, keeping the Space Station intact domestically rivals the international arrangements in difficulty.[192] Arguments in favor of the Space Station have been diverse and complex, combining many different elements and tapping into both traditional policy interests and rhetorical "buzz words" in the search for support.

The next two chapters examine the various arguments employed in support of the Space Station in greater detail to unravel the policy discourse. Chapters 6 and 7 shall identify the major themes and patterns that are contained in the pro-Station discourse. Chapter 6 focuses on those arguments that are based on scientific, technological, commercial, and domestic political bases. Chapter 7 examines those arguments that embody foreign policy ideas or images. As shall be shown, foreign policy has been a dominant influence in the SSP and the arguments arrayed in its defense. Important as well, are the foreign policy ideas that are interwoven into arguments for the Space Station that are not explicitly tied to foreign policy. That discussion is the subject of Chapter 8.

[192] Interview With Greta Creech, 3 August 1999.

CHAPTER SIX

PROMOTING THE INTERNATIONAL THE SPACE STATION I: MISSIONS AND DOMESTIC BENEFITS

We put humans on the moon in less time than we've spent *debating* a space station.

Daniel Goldin (1992)

Means of Argumentation

Since the early 1980s, advocates inside and outside of NASA have produced a wide variety of arguments on behalf of the SSP. These arguments are diverse and internally complex, often embodying conflicting ideas and elaborate chains of logic. Many arguments are based on the missions that the Space Station Program would perform. Others claim the SSP would produce generic social-political goods. Finally, some arguments embody ideas about the future of space exploration that are not universally held but that resonate within the pro-space community.

The arguments provide evidence of the underlying values that SSP advocates believe will generate political support. By examining the public record, these arguments can be readily identified. Congressional hearings, NASA publications, speeches, and other texts, illustrate the central political task: the need to convince policy-makers, and the general public of the project's importance.[1] This chapter, and the one which follows, shall review the major arguments offered by Space Station advocates in the process of program articulation, the process by which a program or policy is promoted, defended, or described. The arguments will be systematized into typologies and analyzed. The domestic arguments discussed here are complex and technical, more so than the foreign policy ones. However, domestic policy is the basis upon which foreign policy arguments are set. Therefore, domestic policy shall be examined first.

Several factors should be noted about the arguments analyzed. First, as noted in Chapter 5, there has been a great deal of ambiguity about the uses and value of a permanent space station. Arguments are often not specific and occasionally contradictory within the same text. In addition, the arguments that appear consistently over time have evolved in subtle ways.

Second, budgetary limitations, the *Challenger* accident, and redesign exercises have forced the elimination of many Space Station missions and the restructuring of others. Missions such as Earth observation, assembly of larger structures, and satellite maintenance, have been reduced in scale or eliminated entirely. While those elements of the SSP that would be most important for missions to the Moon and Mars have been abandoned, the idea of such missions has remained. More modest research goals, life science and material processing research, have endured. This mission loss is reflected in the disappearance of some of the arguments that have been offered, while others, particularly the most abstract and ambitious, have been more consistent.

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[1] For more information on the collection and use of primary documents, see Appendix 1.

Third, some of the arguments examined here may be rhetorical, using key words and phrases but not providing a substantive content. Arguments may also be practical, citing specific benefits or proposals. Both types of arguments are important for our analysis here because publicly stated arguments are an important means of public and elite persuasion. They at times also constitute an "internal dialogue" within a community of individuals that share ideas and support the space program in general. Finally, it is important to note the frequent disconnect which occurs between the claims made about the Space Station and the actual written plans that define the project.

Expressions, Beliefs, and Ideology

Admittedly, many public expressions of belief may simply be rhetoric and there are limits to which the genuineness of a statement may be known. However, expressions, even if partially or fully rhetorical in nature, can still represent real beliefs that the speaker holds and wishes to impart to their audience. A study of public expressions can reveal underlying beliefs, especially if the same expressions or ideas are repeated continually over long periods of time. These phenomena need not be monolithic or even internally consistent. The selection of images depends on the context of the argument and the intended audience. Byrnes' analysis of NASA image making reveals a rich menu of historical and emotional images used to promote human space flight.[2]

Linguistic and communications scholars have noted that expressions made by individuals can influence the speaker's own beliefs. Images and metaphors can influence the perceptions held by individuals who employ them.[3] In addition, pure rhetoric may become institutionalized and evolve into a community belief system that individuals believe and support. Much of the language currently seen in U.S. space policy first appeared in the 1960s during the Apollo program. The words of John F. Kennedy, James Webb, and Werner von Braun are still invoked today. The reappearance of this language reappears indicates an institutionalization of concepts regarding space exploration and its value.

Public statements by political leaders are designed to influence the intended audience. Arguments, such those to be discussed here, are important means of political persuasion, whether directed at an elite or mass audience. Budget-conscious government agencies will be concerned with advancing their activities and protecting their funding. There is, therefore, a temptation to inveigle authority and to employ whatever arguments may be appealing. If arguments are primarily rhetorical, the common themes and images employed should still be analyzed because rhetoric is rarely used unless the speaker

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[2] Mark E. Byrnes, *Politics and Space: Image Making by NASA* (Westport (Connecticut): Praeger, 1994).
[3] Linda Krug, *Presidential Perspectives on Space Exploration: Guiding Metaphors From Eisenhower to Bush* (Westport (Connecticut): Praeger, 1991).

believes that the audience will be swayed by it. Whether the arguments discussed here are pure rhetoric or true beliefs, it is important to deconstruct the component images and ideas that are present. It is the arguments themselves, not their objective validity, which is our concern in this study. Politics is to a large degree an art of presentation and arguments that intend to deceive, inveigle or obfuscate are still important parts of policy discourse. Even disingenuous arguments represent a discourse, if it is observed over time. This being said, it is important to note that the arguments discussed here are *both* rhetorical and serious.

Analogies

The promotion of complex belief systems often require simplified or recurrent images (both verbal and visual) to formulate, propagate, and define an ideological system. Imagery is the production of verbal or material expressions of beliefs and an attempt to make explicit and clear abstract ideas. Verbal imagery, such as describing space as "the next frontier," conjures both an idea of the future (for example the human settlement of Mars) and a bridge to the past (the settlement of the American west). Planting the American flag on the Moon and the recurrence of the image of the event serve a similar purpose: to symbolize the importance of the event and to tie the viewer emotionally to it.

Another form of verbal image building is the use of metaphors to link disparate phenomena, establish a context, and to define reality. Metaphors are important because they are "moral, value-laden, and ideological" phenomena.[4] By making connections between different phenomena, metaphors can justify actions and create an actor's sense of reality.[5] By describing the money spent on space projects as an "investment," the speaker can promote the expenditures as a prudent action that is necessary for the future of the country and the children of the audience-members.

Typologies of Arguments

There have been numerous arguments used in support of the SSP and these arguments have evolved greatly over time. Some arguments have disappeared while new ones emerged. Typically, a string of different types of arguments are mentioned together in a single passage, with Space Station missions described along with other claims. The following statement from a 1987 NASA publication is typical of this "run-on" form of argumentation:

> [The Space Station shall] Stimulate new technologies; Provide versatile, efficient system for conduct of science; Challenge current Soviet advantage in Space Stations; Ensure leadership in space during 1990's and beyond; Function more efficiently in space, building upon previous national investments and enabling activities now not possible; Develop fully the commercial potential of space; Provide a vehicle for international cooperation in space; Stimulate interest in scientific and technical education; Maintain a continuity and focus to the nation's civilian space program; Provide the basis for those future national endeavors in space outlined by the National Commission on Space.[6]

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[4] Krug 1991.

Such masses of information exemplified in this and similar passages need to be systematized so that the complex of different arguments can be discussed. The arguments made in favor of the SSP shall be categorized according to the following types: 1) missions and activities to be performed on the Space Station; 2) benefits and positive stimuli generated by the Space Station; and 3) historical analogies.

A distinction must be made between the different types of benefits that the Station was purported to advance, stimulate, or produce. Some benefits suggested are specific activities that would occur on the Station. These tend to be the most sharply defined activities and are usually described in detail in NASA's utilization plans. Examples include the development of new medicines and Earth observation. Other benefits would be indirect goods that would flow from the construction and use of the Space Station, such as the stimulating the aerospace industry. Finally, there are a variety of intangible benefits that would occur, be stimulated, or be inspired by the very existence of the SSP. These are symbolic benefits and psychological goods and include national pride and international cooperation.

These different benefits may be defined as missions, secondary benefits, and intangible benefits. "Missions" are activities (material processing, study of space biology) individual and group researchers would carry out on the

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[5] George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980).
[6] Andrew Stofan, *Space Station: The Next Logical Step*, (Washington: NASA, 1987).

Space Station. NASA has routinely used three broad categories of missions on the SSP: 1) basic scientific research, 2) technology development and its application to industry, and 3) commercial development of space.[7] Each category contains a varying set of specific missions that would be carried out on the SSP. The specific missions have not been constant, as many have been abandoned during the development and redesign phase. The period when the SSP had the greatest number of missions was the early period (1983-86) before detailed designing and redesigning occurred. "Secondary benefits" are those that would come indirectly from the design, construction, and use of the Space Station. Secondary benefits are described as flowing from two activities: 1) the industrial return value (i.e. the money that flows to firms tasked with Station construction); and 2) the unplanned application of SSP technology or experience to other fields. These are the spin-off benefits traditionally tied to space activities. Notable examples include jobs in the aerospace sector and the unintended application of space hardware or research. Spin-off applications often cannot be specified because the application of yet to be gained information is an unknown. However, in the SSP promotional literature, the precedents of the Apollo and Shuttle programs provide anecdotal examples of this phenomenon. Unknown benefits also act as a "moving target" for critics; serendipitous benefits cannot be easily countered or challenged. Critics of a

[7] NASA, *Space Station Freedom: Gateway to the Future* (Washington: NASA, 1992).

space project can also be accused of lacking vision or being unwilling to invest in the future.

"Intangible benefits" are the emotional, symbolic, or psychological effects that result from the building and existence of the SSP. Intangible benefits include the emotional satisfaction or inspiration that would arise from the SSP. Additionally, the SSP would be a symbol of American power. The rest of the world would also benefit from a Space Station dedicated to peaceful uses, even when operated by the US. Intangibles are by their very nature difficult to quantify and are often fuzzy in their definition and meaning. However, this has not prevented these alleged benefits from becoming important in the SSP discourse.

The Missions of the Space Station

"The Knowledge Engine": The Space Station as Research Laboratory

As befitting a facility built in space, the first mission described for the Space Station is a laboratory for new sciences, technologies, and medicines.[8] The Space Station missions that are usually mentioned first are scientific and technological research: "The Space Station, as envisioned by NASA, will be a permanent, multi-purpose facility in orbit. It will serve as a laboratory to conduct

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[8] NASA, *The Next Logical Step* (Washington: NASA, 1985); Andrew Stofan, *A Research Laboratory in Space*, (Washington: NASA, 1987); Daniel Goldin, "Remarks Prepared For Delivery, Opening Ceremony Rhode Island Manufacturing Week," NASA [On Line], Accessed 11 May 1999, ftp://ftp.gq.nasa.gov/pub/pao/Goldin/1998/rhodeisland.html, 5.

basic research, an observatory... a manufacturing plant to make exotic metal alloys, super-pure pharmaceuticals or perfect crystals..."[9] The research mission of the Station is fundamental, even as the project's political rationale has shifted: "The Station is first and foremost a research laboratory;"[10] "The most basic reason for building a space station is to explore the space environment and stimulate scientific and technological discoveries that will benefit the United States and humanity."[11] Because the Station would be permanently occupied, it would have a special value and be a new opportunity for researchers.[12] Year-round long-term research could be conducted. "A unique environment for research" and "unparalleled opportunities for research," are common descriptions of the SSP.[13] The international nature of the SSP would also be unique and valuable to all participants.[14]

The SSP is described as a first-class research facility and a generator of useful information, a "knowledge engine."[15] As a research facility, the SSP would facilitate a variety of scientific fields as well as provide a center for the development of new technologies and industries. Its primary research mission

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[9] NASA, John F. Kennedy Space Center, "NASA Facts: Space Station," (Washington: NASA Historical Collection, 1986).
[10] Andrew Stofan, *Space Station: A Step into the Future* (Washington: NASA, 1988).
[11] "Draft Space Station FY94 Themes. Document in Support of J. Dailey's Memo of 12 May 1993," (Washington: NASA Historical Collection, 1993).
[12] Daniel Goldin, "Tools of the Future (Remarks Prepared For Delivery)," NASA [On Line], Accessed 11 May 1999, ftp://ftp.gq.nasa.gov/pub/pao/Goldin/1998/ise.txt, 5.
[13] NASA, *International Space Station Fact Book 1997* (Washington: NASA, 1997) [Hereafter *ISS Fact Book 1997*]; NASA, *Space Station Freedom: Gateway to the Future*.
[14] The US, European, and Japanese labs all shall deploy standardized International Standard Payload Racks (ISPR), units about the size of a household refrigerator (NASA, *Space Station Freedom: Gateway to the Future*). The Russian lab modules are not of this type (Lynn Cline, Interview With Author, 9 July 1999).

would be to "[p]rovide versatile, efficient system for conduct of science... commerce, and technology."[16] This research would be both scientific and technological: i.e. the discovery of new knowledge and the development and testing of new hardware. "Research on Freedom will spawn new scientific and technical breakthroughs that will contribute to our understanding of fundamental laws of nature, to America's future economic prosperity, and to the quality of life on Earth for all humankind."[17]

Basic scientific research, as defined in Chapter 3, is research into the natural world, not necessarily with a specific commercial application, although commercial development from SSP research was anticipated.[18] Many of the scientific arguments for the SSP refer to specific missions, as defined above, which would be carried out on the Station. One important scientific mission of the SSP would be use of low gravity for chemical, physical, and medical research.[19] Other fields to be studied include space physiology and gravitational biology.[20] More traditional forms of science would also be done on the Space Station, taking advantage of the Station's position in orbit and the space environment.

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[15] "Draft Space Station FY94 Themes...".
[16] Stofan, *Space Station: The Next Logical Step*, 6-7.
[17] Leonard David, *Space Station Freedom: A Foothold on the Future.* (Washington: NASA, 1988). Leonard David is a space policy journalist. This work was written for the NASA Office of Space Station.
[18] Philip Culbertson, "Current NASA Space Station Planning," *Astronautics and Aeronautics* (September 1982), 37-59.
[19] Hans Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College," (Washington: NASA Historical Collection, 1984).
[20] David, *Space Station Freedom: A Foothold on the Future*; NASA, *Science and Applications on the Space Station* (Washington: NASA Historical Collection, 1988).

Material Science

The most important scientific work to be done on the Station would take advantage of microgravity to produce new and purer composite materials than on Earth, including metal alloys, glass, plastics, and ceramics.[21] Microgravity is the most obvious effect of living and working in space. "The near absence of gravity (microgravity) will enable the U.S. to conduct productive research in life and materials sciences."[22] The unique qualities of microgravity were recognized early in the space age as potentially opening up new fields of research. For example, purer silicon wafers could be developed as advanced electronic components.[23] Limited studies of this nature have been conducted on the Space Shuttle, *Spacelab*, and *Mir*. To make full use of microgravity, a large centrifuge module will be added to the SSP. A centrifuge can simulate gravity and can be used to provide controlled experiments into the effect of gravity on metals and other materials.[24]

The *ISS Fact Book* (1997) justified the Space Station by describing its scientific potential: "Why a Space Station? To create a permanent orbiting science institute in space capable of performing long-duration research in the

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[21] Microgravity, also called weightlessness and zero-g, is not the absence of gravity but a state of permanent free fall as a spacecraft "falls" around the earth in its orbit. The effect of gravity is approximately one one-millionth of surface gravity and as a result purer mixtures of materials can be made (NASA, *Space Station Freedom: Gateway to the Future* (Washington: NASA, 1992).
[22] NASA, *Space Station Development Plan, Submitted to the Committee on Science, Space, and Technology, U.S. House of Representatives* (Washington: NASA, 1987), 1.
[23] NASA, *Space Station Freedom: Gateway to the Future*.

materials and life sciences in a nearly gravity-free environment."[25] Material processing research has proven to be one of the most persistently mentioned activities for the SSP, and one of the few surviving missions of those originally proposed in 1984.[26] The 1998 version of the *ISS Fact Book* defines the scientific mission in similar terms: "Space Station will be a unique world-class laboratory providing an international platform for advances in science and technology."[27]

The highly publicized 1999 Shuttle flight of John Glenn was in large part rationalized for its alleged value on the study of aging. Although the Space Shuttle is given as an important precursor, the difference between the Space Shuttle and the Space Station is also highlighted in the SSP literature. The SSP is a *permanent* facility and long-term duration space flight will provide research that is of a new nature. Stress is placed on the newness of the knowledge to be generated:

> As the century turns, Space Station Freedom will open a new era of exploration. Our first inhabited outpost on the frontier of space will be a place to live, work and discover. Experiments conducted on Freedom will advance scientific knowledge about our world, our environment and ourselves. We will learn how to adapt to the space environment and to build and operate new spacecraft with destinations far beyond Earth, continuing the tradition of exploration that began with a journey to the Moon. What we learn from living and working on Freedom will strengthen our expertise in science and engineering, promote national research and development initiatives

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[24] David, *Space Station Freedom: A Foothold on the Future.*
[25] NASA. *International Space Station Fact Book* (Washington: NASA, 1994). This text and subsequent citations from the 1994 *Fact Book* also appear in the 1995 and 1997 versions of the *Fact Book*
[26] Culbertson, "Current NASA Space Station Planning," 37-59.
[27] NASA,. *International Space Station Fact Book 1998* (Washington: NASA, 1998).

> and inspire another generation of Americans to push forward and onward. On the eve of the 21st century, Space Station Freedom will be our gateway to the future.[28]

Space Biology: "A National Institute of Health in Orbit"

A major scientific mission the SSP would perform is biological studies of the effect of weightlessness on living organisms (animals, plants and microorganisms) in order to "conduct medical research in space."[29] Medical research would create "a National Institute of Health in orbit."[30] Spin-offs of space-based research are possible and could benefit millions of people. This research would include the study of the immune system and aging: "Freedom is expected to hasten improvements in medical procedures and increase our understanding of human diseases, aging and immune functions."[31] The effects of microgravity and aging are similar according to Peter Ahlf, current Life and Microgravity manager for the SSP.[32] Such research is described as having applications for *Earth*-based medicine: "[we can] "produce rare, life-saving medicines, saving thousands of lives and hundreds of millions of dollars."[33] "By studying materials on Space Station Freedom, we may learn how to produce

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[28] NASA, *Space Station Freedom: Gateway to the Future*.
[29] *ISS Fact Book 1997*.
[30] Daniel Goldin, "Aerospace States Association," (NASA Historical Collection, 1992).
[31] David, *Space Station Freedom: A Foothold on the Future*; NASA, *Space Station Freedom: Gateway to the Future*.
[32] Peter Ahlf, Interview With Author, 26 June 1999.
[33] Ronald Reagan, "Address at Commencement Exercises at the United States Air Force Academy in Colorado Springs, Colorado," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1984, Book I, 1 January - 29 June 1984* (Washington: US Government Printing Office, 1986). See also Robert Jastrow, "Why We Need A Manned Space Station," *Science Digest* (May 1984), 41-2, 92, 94.

better medicines on Earth."[34] The technology needed to support the Space Station crew is also described as producing valuable medical spin-offs: "Through space station operations, we will better understand the interaction of humans in the hostile environment of space, and the human body, itself, which could improve medical technologies and treatments here on Earth."[35]

The potential of medical research in space gives the SSP a softer edge, embracing average people in need of help. Daniel Goldin in indulged such language in 1992, "[T]here is a second purpose to the space station. For while we may talk a lot about hardware, *there's a soft spot in our hearts. NASA cares.* What we must learn to sustain life in space will enhance and preserve the lives of people on Earth. The miniaturized devices we'll need to invent to get remote medical telemetry from our astronauts could save lives on Earth."[36] Senator Jake Garn made a similar argument in 1990 when promoting the SSP to his colleagues:

> I do not know how you can place a value on certain things. I look back at the arguments that were made against parts of the space program earlier, and a heart pacemaker came out of space research and development. *I do not know how you place a value on a human life. There are tens of thousands of people walking around with pacemakers who are alive because of that development.*[37]

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[34] NASA, *Space Station Freedom: Gateway to the Future.*
[35] Daniel Goldin, "Keynote Address, Goddard Memorial Dinner," (Washington: NASA Historical Collection, 1992); See also Daniel Goldin, "Remarks by Daniel Goldin, NASA Administrator, American Institute for Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1992).
[36] Goldin, "Remarks by Daniel Goldin NASA Administrator American Institute for Aeronautics and Astronautics." Emphasis added.

"A Permanent Observatory"

An additional scientific mission for the Space Station is to be "a Permanent Observatory"[38] to look "down" at the Earth, and "out" at the planets and stars. Earth observation in particular has real and profitable commercial applications.[39] Observation from the SSP could have several dimensions, but the most important would be environmental and resource research.[40] These types of observations are currently made with satellites, and would presumably continue to be. However, the Space Station could supplement satellites and would have the advantage of human control and supervision.

In addition to looking down on the Earth, the SSP was promoted as an astronomical observatory. James Fletcher said in 1986, "An orbiting observatory providing new views and capabilities in astronomy, space and solar physics and the earth sciences."[41] The study of the Sun and planets from space has several advantages, namely getting above the Earth's atmosphere, which reduces the efficiency of ground based telescopes. The atmosphere also

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[37] US Congress, Senate, Senator Garn of Utah Speaking for the *Veterans Affairs, Housing and Urban Development, and Independent Agencies, Commissions, Corporations, and Offices Appropriations, Fiscal Year 1991*, 1990. Emphasis added.
[38] Stofan, *Space Station: The Next Logical Step*. The same scientific missions are listed in Philip Culbertson, "Space Station: A Cooperative Endeavor" (Washington: NASA Historical Collection, 1985); John Hodge, *A Space Station For America* (Washington: NASA, 1985).
[39] Earth observation is defined as use of the visual and other parts of the electromagnetic spectrum to study the Earth's surface. Earth observation has been used for many different commercial purposes in the past three decades, including resource management and environmental monitoring.
[40] James Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society," (Washington: NASA Historical Collection, 1982).
[41] James Fletcher, "Remarks Prepared for Delivery, Council of State Governments, Western States Conference," (Washington: NASA Historical Collection, 1986); see also David, *Space Station Freedom: A Foothold on the Future*.

blocks or filters many wavelengths of radiation, such as x-rays and gamma rays, that astronomers are interested in observing. The Space Station would also facilitate other space science projects through infrastructure support. While this work would have had no commercial value, it would have been pure science. However, Earth and astronomical observations were too expensive to remain politically durable missions for the SSP. They did not survive the redesigns of the late 1980s and are not mentioned in current plans.

"Stimulate New Technologies"[42]

According to one NASA publication, "The Station is first and foremost a research laboratory. We are building an orbiting laboratory... [for] the development of technologies."[43] The SSP has been constantly promoted as a technology driver and a means to "stimulate technologies of national importance (especially automation and robotics)."[44] The development of new technology is so central to the SSP that protection of intellectual property rights was specifically cited in the various SSP MOUs.[45] The 1997 *ISS Fact Book* claims that the Space Station would "accelerate breakthroughs in technology and engineering that will have immediate, practical applications for life on Earth- and will create jobs and economic opportunities today and in the

[42] Stofan, *Space Station: The Next Logical Step.*
[43] Stofan, *Space Station: A Step into the Future.*
[44] NASA, *Space Station Development Plan.*
[45] 1988 IGA Art. 21; 1998 IGA Art. 21. The 1985 NASA-ESA MOU defined the Space Station as "a laboratory in space for the conduct of science and the development of new technologies," NASA-ESA MOU 1985 Art. 2. See Chapter Five for a discussion of the Space Station MOUs.

decades to come."[46] More practical than the previous set of arguments, technology development has a definite economic (and political) purpose. In the pro-SSP literature, there are numerous cases where technology is linked to economic performance, growth, and prosperity. Practical application of space technology can be described in simple terms. One clear claim of space research producing economic returns is found in the 1997 *ISS Fact Book*. The US economy would gain from improved heating systems stimulated by space technology: "A two percent increase in burner efficiency for heaters would save the United States $8 billion per year."[47] While this statement does not actually claim the SSP will produce this particular breakthrough, it is offered as an example of how space technology can be spun-off to improve existing technological systems. Further benefits would accrue by the spinning-off of Space Station derived technologies into the commercial sector. Subsequent ripple effects, would stimulate additional applications and developments.[48]

Commercialization of the SSP would support private sector research. Private research in space would be facilitated by the Space Station and commercial use of space would also be stimulated. This would produce more efficient use of existing technologies and processes and to a subsidized resource for research in space technology. Wider commercialization of space would encourage new companies to invest in space. Space industrialization

[46] *ISS Fact Book 1997.*
[47] *ISS Fact Book 1997.*
[48] NASA. *Space Station Freedom: Gateway to the Future.*

would facilitate and encourage further development in space technology and utilization.

The SSP was part of the privatization philosophy of the Reagan Administration. A stated goal of the SSP has been the encouragement and development of commercial space industries using the Space Station.[49] "The Station is first and foremost a research laboratory... [for] the stimulation of commercial space enterprises."[50] Privatization of all or a part of the Space Station is hinted to as a possible future policy as the space economy develops: "it is not difficult to see a dedicated module, or even a separate Space Station, owned by private business, devoted exclusively to commercial operations."[51] The Station's infrastructure and overall capabilities are identified as valuable to the private sector: "The benefits to commercial customers of an operational Space Station in orbit and 'open for business' are manifold. The Station itself, as a permanent facility, offers the kind of program stability and continuity private investors seek."[52] Commercial activities are valuable because "in space there are real resources and opportunities for commercialization and industrialization."[53]

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[49] *ISS Fact Book 1997.*
[50] Stofan, *Space Station: A Step into the Future.*
[51] Philip Culbertson, *Space Station: A Cooperative Endeavor* (Washington: NASA Historical Collection, 1985).
[52] Culbertson, *Space Station: A Cooperative Endeavor.*
[53] James Beggs, "Why the United States Needs A Space Station."

Science and Technology Development: Discussion

Science is the first mission of the SSP mentioned in the pro-Station literature. "Science" as a category of argumentation is vast and highly complex, encompassing many overlapping activities. In general discussion, most of the activities to be carried out on the SSP are regarded as "science" or "space exploration." In tone, scientific research is a broad "catch-all" type of argument, embracing much of the work done on the Station, either by government or corporate-sponsored researchers.

NASA publications have tended to define science more narrowly, focusing primarily on research into physical phenomena. While much of the proposed work would be fairly basic research (as defined in Chapter 3), some of the materials processing research could be seen as pre-commercial or even the first stage of a new industry, as some pro-SSP literature suggests. The "purest" science is of course space science and physics, for which there is no commercial application. However, many SSP texts urge the reader to be open to the possibility that pure research "will lead to discoveries we cannot yet imagine."[54]

The benefits that would emerge from this research are described as widespread and applicable to a variety of fields. Material processing research has the clearest commercial value, for space-developed materials potentially

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[54] NASA, *Space Station Freedom: Gateway to the Future.*

could become marketable products.[55] Medical research as a SSP mission has great emotional appeal, especially to politicians attempting to impress an audience. Research to cure a common disease like diabetes (however remote) is a goal that is impossible to criticize.[56] It is difficult to dispute the value of socially relevant research.

Spin-offs are central to the science and technology argument. The application of space technology to other business sectors is a recurrent theme. Space Station research is described as cutting edge and potentially able to create unanticipated benefits "we cannot even begin to imagine."[57] This phenomenon- the serendipity factor- is based on past experience as well as simple optimism. The uncertainty of gains can actually be used in favor of the SSP. The assumption is that progress comes from daring steps: "Thrusts into the unknown have led to the discovery of new lands, to development of new technologies such as transistors and breakthroughs in medicine that eliminated smallpox, polio and other diseases," Administrator Richard Truly wrote in a letter to the *New York Times*.[58] Society can only advance through exploration and discovery, through efforts like the Space Station. Discovery aids the economy, national strength, and society.

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[55] See Lucas L. McLucas, *Space Commerce* (Cambridge (Massachusetts): Harvard University Press, 1991).
[56] Ronald Reagan used diabetes research as an example of the value of the Space Station in a question and answer session in 1985 (Ronald Reagan, "Question-and-Answer Session With Students at Fallston High School in Fallston, Maryland, 4 December 1985," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1985 Book II, June 29 to December 31, 1985*, (Washington: US Government Printing Office, 1988), 1434-40.
[57] Daniel Goldin, "Tools of the Future," 5.

However, science, as other activities on the Space Station has a hard edge: the maximization of US power. The ultimate goal is American leadership (economic and political) and to "establish our leadership in space science and exploration."[59] The fact that space is a competitive realm is also important. In an interview with the author, James Beggs expressed concern that the United States was not investing enough in science and technology vis-à-vis other countries. According to this position (occurring throughout the SSP discourse), knowledge is power. S&T projects like the SSP are a means to "flex the muscles" of American industry and academia in order to provide for the future.

"A Way Station to Worlds Beyond": The Space Station as Infrastructure[60]

A second major mission-cum-argument for the SSP was the development of a complex space infrastructure. Space infrastructure may be broadly defined as facilities in orbit, on the Moon or planets. Advocates claim that the evolutionary development of space facilities and experience will enable more people to live and work in space, making space activities "routine." Space flight has indeed become more common, if admittedly not an everyday occurrence. By the end of 2000 approximately four hundred people had flown in space, some multiple times. This is important for space advocates, because infrastructure would make expanded exploration and use of space possible:

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[58] Richard Truly, "No 'Horrible Design Flaw' in the Space Station," *New York Times* (23 April 1990 [Item dated 5 April 1990]), A18.

"[The SSP] is critically important because it will enable us to return to the Moon, this time to stay, and later to embark upon a human mission to Mars."[61]

This infrastructure was to support NASA's incremental plan of space expansion.[62] The research done on the SSP would provide the necessary information (medical and engineering) for the human "conquest" of space: "[The] Space Station is the gateway to new frontiers in human space exploration and meets the deep-seated need of men and women throughout history to explore the unknown, to understand their world and the universe, and to apply that experience for the benefit of all here on Earth."[63] This mission is described as long-range, even multi-generational, in nature.

However, the scale of space operations is still relatively small compared to the ambitions of human dreamers. While some of the more ambitious proposals appear to be science fiction, they have been seriously studied since the 1950s. Serious space infrastructure elements proposed in the SSP literature include mining (of the Moon or asteroids), research bases (on the Moon or Mars), military space stations, tourism, and colonization. Development and utilization of the SSP is presented a means to practice for these future goals.

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[59] NASA. Space Station Freedom: Gateway to the Future. Washington: NASA, 1992.
[60] David 1988.
[61] Daniel Goldin, "Remarks by Daniel Goldin NASA Administrator American Institute for Aeronautics and Astronautics" (Washington: NASA Historical Collection, 1992; Daniel Goldin, "Keynote Address, Goddard Memorial Dinner" (NASA Historical Collection, 1992).
[62] Howard McCurdy, *The Space Station Decision: Incremental Politics and Technological Change* (Baltimore: Johns Hopkins University Press, 1990).
[63] NASA, *International Space Station Fact Book 1998* (Washington: NASA, 1998).

Missions to the Moon or Mars, distant as they may be, are a reason to accumulate necessary experience *now*: "A Space Station is the only place where such activity can be accomplished. The Space Station thus will be a laboratory for preparatory work essential to any future manned space exploration. And it will serve, when the mission begins, as a point of departure for this lengthy, bold yet hazardous journey. The Space Station is thus an *enabling* capability for the future."[64] The US cannot seriously consider future space exploration without laying the foundation first in the machines necessary to support humans in space.[65] In this perspective, the SSP is not a dead end program but an enabling project. It is not a sufficient component for these goals, but a necessary one.

In-Orbit Maintenance and Construction.

Infrastructure serves several purposes. Expanded facilities require a ready base for repair and maintenance. The Space Station is described as a servicing facility to expand the efficiency of space utilization.[66] The SSP would serve as "a garage to fix and service other spacecraft... an assembly plant to build structures too large to fit in the Shuttle's cargo bay, and a storage warehouse to keep spare parts or even entire replacement satellites."[67] Various

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[64] Andrew Stofan, *Space Station: A Step into the Future* (Washington: NASA, 1988), 1. Emphasis added.
[65] James Beggs, Interview With Author, 22 July 1999.
[66] NASA, John F. Kennedy Space Center, "NASA Facts: Space Station" (Washington: NASA Historical Collection, 1986).
[67] NASA, "NASA Facts: Space Station."

types of satellite servicing, such as "equipment changeout, consumable replenishment, and repair," would be a new approach to managing space assets.[68] Satellites, space probes and other space hardware could be "checked out" at the SSP prior to final deployment to ensure proper functioning. Existing satellites could be retrieved for repair on the SSP or returned to Earth, a procedure pioneered on the Space Shuttle. Satellites which have exhausted attitude fuel or that have worn out, could be refurbished. The 1984 repair of the *Solar Max* satellite, during Shuttle mission 41-C, is often cited as an example of this procedure.[69] Hans Mark, in his memoirs, gave credit to the *Solar Max* mission as producing support in Congress for the SSP.[70] Again, the Space Station promised to expand upon a capacity that the Shuttle had pioneered. These activities promised economic value as well as high tech toys.

In addition to repair, the SSP was also promoted as a means to assemble large structures in orbit.[71] The SSP would be "[a]n assembly facility where, due to ample time in orbit and the presence of appropriate equipment, large structures are put together and checked."[72] Many projects that space

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[68] H.T. Fisher and K.J. Forsberg, "Satellite/Platform Service and Maintenance," In *Space Station: Policy, Planning and Utilization*, Mireille Gerard and Pamela Edwards, ed. (New York: American Institute of Aeronautics and Astronautics, 1983); Philip Culbertson, *Space Station: A Cooperative Endeavor* (Washington: NASA Historical Collection, 1985).
[69] Hans Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College" (Washington: NASA Historical Collection, 1984); James Beggs, "Remarks Prepared For Delivery at the Conference on International Business in Space" (Washington: NASA Historical Collection, 1985); NASA, *NASA Pocket Statistics* (Washington: NASA, Headquarters Facilities and Logistics Management, 1997).
[70] Mark 1987.
[71] NASA, *Space Station Freedom: Gateway to the Future.*
[72] Philip Culbertson, "Space Station: A Cooperative Endeavor" (Washington: NASA Historical Collection, 1985).

advocates seek, including missions to Mars, would be far too large to launch as a single unit. Multiple launches would be required and extensive space walks needed for assembly. The complexity of the SSP would produce the skills needed for such advanced work.

"A Staging Base For Future Endeavors"

The SSP is also described as a "base camp," "operations base," or "support base" for further Solar System exploration.[73] In addition to in-orbit maintenance, advocates suggest that the SSP is an ideal asset for Solar System exploration. The MOUs and IGAs, while recognizing that these were only *potential* missions, listed human missions to the Moon, Mars and the Asteroid Belt as possible future uses of the SSP. The Station could also serve as a quarantine shelter for a crew returning from Mars. This type of exploration was never more than a study topic during the time period studied. However, it has been an implicit, often explicit, part of NASA's public discourse. Such aspirations give direction, meaning, and importance to current activities.

The SSP would be a training ground for future space missions: "The ultimate purpose of Space Station Freedom is to serve as our rite of passage

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[73] James Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society" (Washington: NASA Historical Collection, 1982); James Fletcher, "Remarks Prepared for Delivery, Council of State Governments, Western States Conference" (Washington: NASA Historical Collection, 1986), 6; James Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England" (Washington: NASA Historical Collection, 1984); Culbertson, "Current NASA Space Station Planning," 37-59; Hans Mark, "The Space Station-- Mankind's Permanent Presence in Space, The Aerospace

into the solar system."[74] Constant space activities would increase the experience base of NASA and its personnel. The SSP would be a location to test techniques and hardware for planetary exploration.[75] A mission to Mars or a return to the Moon, missions proposed by many space advocates, would require new developments in technology. Advanced spacecraft would be a new order of complexity in construction and control, and would require highly reliable electronics.[76] A permanent space station would be a testing ground for such technologies.

Even though Space Station missions were reduced in the late 1980s, the cause of Solar System exploration remains part of SSP advocacy: "The U.S. is committed to the exploration and use of space for peaceful purposes. The world-class research performed on Space Station Freedom will continue the tradition of U.S. leadership in space for decades to come. It will also allow us to investigate the science and technology that underlies long-term human exploration of the solar system."[77] The SSP is still described as the necessary step before human missions to Mars can be contemplated.

Medical Association Louis H. Bauer Lecture," (Washington: NASA Historical Collection, 1984); NASA, "NASA Facts: Space Station."
[74] David 1988.
[75] David 1988.
[76] NASA, *Space Station Freedom: Gateway to the Future.*
[77] NASA, *Space Station Freedom: Gateway to the Future.*

"The Next Logical and Necessary Step in Our Conquest of Space."[78]

The concepts of logic and progress weigh heavily on the space program and the SSP in particular. Successive projects, Mercury to the Shuttle, have been presented as a logical sequence of events:

> The history of America's manned space program for the past two and a half decades has been built upon a series of logical steps. Man's first trips into space were short, daring feats made by men of unsurpassed skill and courage... longer space flights were conducted to prove that man could perform the intricate maneuvers that would be required to achieve a lunar landing... At the twilight of the moon-landing missions, America's space program came to a crossroad. It was time to chart a new course- a course that would demonstrate that man could not only function effectively in space, but he could exploit it for the benefit of all mankind as well. Even before man took his first cautious steps into space, he dreamed of a permanent outpost in orbit...[79]

The idea that space exploration follows a logical course does not originate with the SSP. The early history of the US space program has been incorporated into this model of progress. NASA has drawn on the logic of the Space Station as a midway point between early spaceflight and the future: "The objective of the Apollo Program, to explore the moon, was a beginning not an end...any such missions [to the Moon or planets] would utilize a Space Station as a point of departure." To do further space exploration, a [space station] was a step the United States would have to take."[80]

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[78] Dale Myers, "Excerpts From Remarks Prepared For Delivery: Air Force Association National Symposium, Colorado Springs, Colorado," (NASA Historical Collection, 1987).
[79] NASA, "NASA Facts: Space Station."
[80] NASA, *Space Station Development Plan, Submitted to the Committee on Science, Space, and Technology, U.S. House of Representatives* (Washington: NASA, 1987), 2, 4.

This was not a new concept, as the Space Shuttle was described a Grumman Aerospace publication as the "Next Logical Step."[81] However, the Shuttle and the Space Station are a logical, integrated whole: "The Space Station is the next logical step in space, and the Shuttle, the previous step, will provide the economical access to low earth orbit we need to build it."[82] Without a Space Station, the space program was incomplete: "Now that we have the Space Shuttle, we owe it to the Nation to make optimum use of this new capability of routine and reliable access to and from space... In fact, the Shuttle program originally was conceived to include a space station."[83] "The Space Shuttle is the foundation upon which the very concept of a permanently manned Space Station is built."[84] John Hodge said in 1983, "With due respect to the shuttle, really think the shuttle in [the Space Station] concept is being used for what it was originally designed for, which was to tend facilities and to place things in orbit, rather than to act as a pseudo space station."[85]

The idea of logic was embodied in the SSP's semi-official slogan, "the Next Logical Step." Hans Mark said in a 1984 speech that the Space Station is

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[81] Grumman Aerospace Corporation, *Space Shuttle... The Next Logical Step* (Bethpage (New York): Grumman Aerospace Corporation, 1971).
[82] James Fletcher, "Remarks Prepared for Delivery, Council of State Governments, Western States Conference," (Washington: NASA Historical Collection, 1986). A similar formulation is used by James Beggs in, James Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England," (Washington: NASA Historical Collection, 1984).
[83] Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society."
[84] Stofan, "Space Station: The Next Logical Step," 5.
[85] US Congress, House of Representatives, Committee on Science and Technology, Subcommittee on Space Science and Applications, *1984 NASA Authorization* (Washington: Government Printing Office, 1983), 1328. John Hodge was Head of the Space Station Task Force in 1982 and Deputy Associate Administrator for the Space Station from 1984 to 1987.

"the next large step of mankind's movement into space."[86] Briefly, after the *Challenger* accident, the slogan became, "Still the Next Logical Step" to reinforce that, despite the tragedy of 28 January 1986, the goal of the space program- increased accessibility to space- was intact. Andrew Stofan wrote in 1987 that "[t]he Space Station- and still is- the next logical step for our nation in the exploration and utilization of space... [it will] Maintain a continuity and focus to the nation's civilian space program... As a program it is about to move into a critical stage. Now more than ever, the Space Station is important to our future and we must move forward as planned."[87]

"Man's Destiny": Colonizing the Solar System[88]

The most ambitious argument used for the SSP connects it to a broader goal of space colonization. The discourse of US space policy contains frequent references to the belief that Humanity *should* (a normative claim) and *shall* (a predictive claim) colonize the Solar System and beyond. This idea of space colonization, cited by this author elsewhere as manifest destiny in space,[89] rests on the intellectual tradition of the pre-space age, including Konstantin Tsiolkovskii and Robert Goddard. As such, it predates NASA and real space

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[86] Hans Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College," (Washington: NASA Historical Collection, 1984).
[87] Stofan, "Space Station: The Next Logical Step," 1, 5, 6.
[88] George Bush, "Remarks at a Republican Campaign Rally in Houston, Texas, November 5, 1990," In *Public Papers of the Presidents of the United States: George Bush 1990. Book II, July 1 to December 31, 1990* (Washington: U.S. Government Printing Office, 1991), 1566.
[89] Karl Leib, "International Competition and Ideology in US Space Policy," *International Studies Notes* 24:3 (Fall 1999). This section is drawn in part from this article.

flight but can be found in many SSP texts. However, these ideas do not exist within the SSP discourse as a specific mission. Colonization has never been a part of US space policy. This idea, implicit or explicit, does permeate the NASA literature.

This expression embodies the idea that space flight and the colonization of other worlds are the natural developments of civilization and the evolution of life. The Space Station is merely one stage in the human destiny to explore, settle, and "conquer" space (with Humanity usually masculinized as "Man"). The space age itself is described as the next step in the progress of civilization: "Space is the manifest destiny of a new generation and a new century."[90] The desire to explore the next valley, the oceans, the highest mountaintops, and now space is, "in the genes," as former NASA Deputy Administrator Hans Mark described it.[91] The development of technology follows the same pattern, progressing from the stone-age to the space age through a steady exploration of new ideas and techniques.

There are frequent allusions to colonization in the political discourse of space. Ronald Reagan said in 1988 that despite the setback of the *Challenger* accident, "leadership on Earth will come to the nation that shows the greatest leadership in space. It is mankind's manifest destiny to bring our humanity into

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[90] Bush, George, "Remarks on Signing the Executive Order Establishing the National Space Council," In *Public Papers of the Presidents of the United States: George Bush 1989. Book I, January 20 to June 30, 1989* (Washington: U.S. Government Printing Office, 1990), 457.
[91] Hans Mark, Interview With Author, 23 January 1998.

space; to colonize this galaxy."[92] In 1989 George Bush stressed this as a goal of the American space program: "We must commit ourselves anew to a sustained program of manned exploration of the solar system- and yes- the permanent settlement of space."[93] Daniel Goldin made a similar statement in 1992: "Space is the next frontier and it is human destiny to go out into space...Eventually we are going to break the chains that tie us to planet Earth."[94] The ISS is as the means to begin to "explore, ultimately to migrate, far beyond our world."[95] Congressman George Brown (D-Ca) commented in an interview shortly before his death in 1999, "human settlement of the universe is, beginning with what's nearest to us, an inevitable progression of human beings."[96]

The colonization of space has a well-established place in NASA strategic thinking and is deeply rooted in the space community. The 1986 Report of the National Commission on Space embraced the goal of making the Solar System "the Home of Humanity."[97] NASA's internally produced "Human Exploration and Development Space Plan," published in 1996, contains a long-term goal to

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[92] Ronald Reagan, "Remarks at the Johnson Space Center in Houston, Texas, September 22, 1988," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1988-89 Book II, July 2, 1988 to January 19, 1989* (Washington: US Government Printing Office, 1991), 1200.
[93] George Bush, "Remarks on the 20th Anniversary of the *Apollo 11* Moon Landing, July 20 1989," In *Public Papers of the Presidents of the United States: George Bush 1989. Book II, July 1 to December 31, 1989* (Washington: U.S. Government Printing Office, 1990), 990-3.
[94] Daniel Goldin, "The Goldin Interview," Interview by Alan Ladwig. *Final Frontier* (October 1992), 22-3, 50-3.
[95] NASA, *The Best We Can Be* (Washington: NASA, 1989).
[96] George Brown, "George E. Brown Jr., the Congressman Who Loved Science," Interview With Claudia Dreifus. *New York Times* [On-Line Version] (9 March 1999), http://www.nytimes.com
[97] National Commission on Space, *Pioneering the Space Frontier* (New York: Bantam Books, 1986).

"settle the solar system." 1998's "NASA Strategic Plan" does not mention settlement, but does speak of human exploration of the "solar system and beyond.[98] It *is* official NASA policy to develop the means to establish a permanent human presence in space through the SSP, and in the future, "Beyond Earth Orbit."[99]

The Holy Grail of NASA and its supporters remains the planet Mars. The Red Planet has long been identified as a possible site for colonization and planetary engineering.[100] The 1987 Ride report produced by former astronaut Sally Ride endorsed the more specific goal of "exploring, prospecting, and settling Mars."[101] Daniel Goldin has embraced the Mars dream publicly: "my dream... gaining enough knowledge on the International Space Station to leave Earth orbit so hopefully one day, an astronaut wearing a white suit with an American flag on her shoulder, can climb down the steps of a spacecraft... and crunch her boot on the dusty red surface of Mars."[102]

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[98] NASA, *NASA's Enterprise For the Human Exploration and Development of Space: The Strategic Plan* [On-Line Document] NASA, Accessed 27 June 1997, www.osf.hq.gov/heds/hedsplan.html; NASA, *NASA Strategic Plan: 1998 NASA Policy Directive* NASA [On-Line], Accessed 17 December 1997, www.hq.nasa.gov/office/nsp.
[99] NASA, *Agenda For Tomorrow* (Washington: NASA, 1989).
[100] Planetary engineering refers to the modification of a planetary environment to make it more Earth-like. See also Robert Zubrin, *The Case for Mars: The Plan to Settle the Red Planet and Why We Must* (New York: Touchstone, 1997).
[101] Sally Ride, *Leadership and America's Future in Space: A Report to the Administrator* (Washington: NASA, 1987). Even the more cautious Augustine Report endorsed a long-term goal of human Mars exploration (Advisory Committee on the Future of the U.S. Space Program, *Report of the Advisory Committee on the Future of the U.S. Space Program* (Washington, DC: U.S. Government Printing Office, 1990)).
[102] Daniel Goldin, "Remarks Prepared For Delivery, Opening Ceremony Rhode Island Manufacturing Week," NASA [On Line], Accessed 11 May 1999, ftp://ftp.gq.nasa.gov/pub/pao/Goldin/1998/rhodeisland.html, p. 3. The image of a female astronaut taking that first step is itself an attempt to counter the traditional gender assumptions of the past.

Even though no human missions to Mars are currently planned, many NASA projects are politically justified by their relationship to a "Future Manned Mars Mission."[103] Mars is so often identified as the next step in space exploration because it is the most suitable site for human exploration after the Moon. Mars has public appeal as well as scientific value. The prospect of discovering extant or fossilized life on Mars is a strong scientific lure. Mars is also the obvious place in space to the public, having witnessed countless popular culture references to the red planet, from H.G. Wells to David Bowie. Therefore, Mars is a politically potent answer to the question of "what is a space station for?"

Infrastructure and Space Settlement: Discussion

The idea that Humanity should expand into space is advanced by many space enthusiasts and activists in universities, business, and in grassroots organizations. More importantly, policy-makers and advisors, including elected officials, administrators, and scientists, have also expressed such aspirations. Advocates of space colonization stress the role of human space flight and the goal of people actively exploring space. Space is described as domain for numerous valuable human activities: "space, we now know, is not just a place to visit. It is a place to work."[104]

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[103] Terence Finn, *Space Station Program History: 1981-1987* (Washington: NASA Historical Collection, 1988), Slide OSSTT 39D; The same slide appears in, NASA, "Space Station" [Slide Presentation], (Washington: NASA Historical Collection, 1988).
[104] Beggs, "Why the United States Needs A Space Station..."

The existence of space infrastructure becomes an argument itself for more infrastructure and in essence is self-supporting: "If we are going to have those permanent facilities, they are going to go wrong, and we are going to have to fix them. We are going to have to replenish them with consumables and, therefore, the servicing function is a very important part of this capacity."[105]

Space is portrayed as an arena of competition *and* an opportunity for cooperation among states. Space is traditionally referred to the "new frontier" and space budgets are defended as "investments in the future." Poetically, Humanity is described as standing on the threshold of a new stage of history. The colonization idea is the most dramatic element of this discourse. Materialistic claims about the economic, political, and social value of space are also made. Other countries are simultaneously seen as both competitors and partners. Arguments for space rely on both emotion and pragmatism, and appeal rather awkwardly to both nationalist and globalist impulses.

The beautiful dream of colonizing other worlds is by no means a certain or inevitable development. Colonization (or commercialization for that matter) will not necessarily follow from present activities. Voluntary migrations of the past have been driven by economic and political forces and by people aspiring to better lives or fleeing intolerable situations. Many others have been forced into migrating to distant lands. More than idealism and a sense of a "species

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[105] John Hodge in, US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983), 6.

goal" will be needed to replicate past migrations on an interplanetary scale. In addition, the present state of space technology makes such dreams uneconomic. There is little in the way of economic gain to be made from human space flight, with the possible exception of space tourism.[106] Beyond their scientific value, space bases might serve as political statements like some Antarctic research stations, but they would not necessarily provide any economic benefit over the short or medium term.

In addition, the present SSP is not an ideal platform for the expansion of civilization into space. Many of the infrastructure missions have been deleted from the current ISS model. While the ISS could serve as staging and training outpost, it will not have facilities for satellite maintenance or the assembly of larger structures. However, the Space Station does allow for additional missions once the basic architecture is in place. As the SSP is theoretically evolvable and sustainable beyond its 10-year life span, additional activities could be added later. Ultimately, however it is the *promise* of future space exploration that is attached to the SSP, rather than specific, planned missions. Expansion of space infrastructure and manifest destiny must remain for later decades or generations to pursue.

[106] Former NASA official Phil Culbertson noted that the only economic motive for a return to the Moon would be the discovery of Helium Three (H3) deposits. H3 would have value as fuel for fusion power reactors, although these have yet to be developed (Phil Culbertson, Interview With Author, 7 April 1998).

Benefits To Be Generated by the Space Station

The second group of arguments to be discussed focus more on what the Space Station will generate or inspire, and less on the specific things that will be done on or around the Space Station. These benefits often referred to as spin-offs, industrial return, or unanticipated effects, are described by this study as secondary benefits.[107] They consist of the economic and social benefits of space activities and/or expenditures.

"Humanity's Greatest Resource": The Space Station as Economic Stimulant

Important for the SSP discourse are claims of economic benefit. As noted by Byrnes (1994), the linkage of space activities and economics increased during the 1970s, when officials stressed pragmatism.[108] NASA itself is described as a generator of technology and future competitiveness:

> Every time America has gone to the frontier, we've brought back more than we ever imagined. NASA's ultimate mission is to pursue cutting-edge technology. That's crucial to America's competitiveness-- crucial to creating the jobs and industries of the future. As NASA turns dreams into realities, it gives America reason to hope our future will be forever brighter than our past.[109]

[107] These spin-offs are those that go beyond S&T transfers previously discussed.
[108] Mark E. Byrnes, *Politics and Space: Image Making by NASA* (Westport (Connecticut): Praeger, 1994);
Linda Krug, *Presidential Perspectives on Space Exploration: Guiding Metaphors From Eisenhower to Bush* (Westport (Connecticut): Praeger, 1991).
[109] Daniel Goldin, "Remarks by Daniel Goldin NASA Administrator Before the Aerospace Industries Association," (Washington: NASA Historical Collection, 1992).

Similarly, the SSP is described as promoting certain domestic political and economic goals: James Fletcher argued in 1988 that "[o]n Earth [the Space Station] will create jobs, spur the economy, and foster the development of U.S. technology and commercial gain."[110] The 1998 *ISS Fact Book* lists commercial development as a key mission of the program: "Space Station will enable the creation of new commercial enterprises that can use the environment, technologies, and research applications of space to build profit-based private business."[111]

This economic benefit is described in broad terms but there is also a tone of urgency. Hans Mark in 1983 said, "We must not let the same thing happen in our business that has happened to many other American industries. We must also understand how to turn the technological leadership in space that we now enjoy to the advantage of the United States."[112]

The knowledge engine of the previous section is also an economic engine. First, the SSP itself would be a high technology product that would require considerable government funding to produce. Second, the SSP itself would produce numerous economic benefits, both directly and as spin-offs into the non-space economy. Finally, the SSP would enable the production of new high technology products that would spark new industries. This would then "maintain U.S. leadership in space and in global competitiveness, and to serve

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[110] James Fletcher, "Letter From James Fletcher to Patrick Leahy," (Washington: NASA Historical Collection, 1988).
[111] NASA, *ISS Fact Book 1998.*

as a driving force for emerging technologies."[113] As discussed in Chapter 3, advanced technology has traditionally been associated with economic growth, progress, and power; the SSP is the very summit of technology: "[The Space Station] would represent a major step toward the goal of true exploitation of the opportunities which space provides for improving our nation's position in the world and for improving the quality of life for all mankind."[114]

The Space Station was rhetorically imbedded in Reagan Administration policies to commercialize space activities to the greatest degree possible.[115] New commercial industries are predicted to emerge from Space Station research.[116] The SSP was described from the beginning as a place where "new opportunities for free enterprise" would occur.[117] Private industry would be able to use and benefit from the Station. As noted, officials suggested that parts of the Station itself could be privately built or privatized.[118] Dan Quayle said in 1990: "In the next century, space will be providing even more valuable products and services. New medicines and medical understanding from research and

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[112] Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983).
[113] NASA, *ISS Fact Book 1997* (Washington: NASA, 1997).
[114] Beggs, "Why the United States Needs A Space Station..."
[115] James Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England," (Washington: NASA Historical Collection, 1984).
[116] Beggs, "Why the United States Needs A Space Station..."
[117] Ronald Reagan, "Address Before a Joint Session of the Congress on the State of the Union," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1985 Book I, January 1 - June 28 1985* (Washington: US Government Printing Office, 1988), 133.
[118] John Hodge in, US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983), 117, 121; NASA, "Fiscal Year 1985 Budget Press Briefing," (Washington: NASA Historical Collection, 1984);
NASA, *Space Station Development Plan*, 16.

manufacturing in space could cure dreaded diseases and extend life. Material from the Moon could enable us to supply many of the earth's energy needs safely and cleanly from space. Space exploration could give us access to precious metals of various sorts-- the equivalent of finding whole new continents."[119]

All of these factors would benefit the US economy: "the space program is a vital part of America's technological base, and we increasingly will be examining the role it can play in helping to insure the nation's long-term competitiveness."[120] As we have seen in other instances, the NASA literature warns of dangers from competitors. This brings an air of urgency to the arguments:

> The potential of space promises countless economic benefits to all spacefaring nations. The useful products and new processes that result from space research should create new jobs in business and industry. New ventures in manufacturing, health and medicine, communications and electronics will continue to be critical to our economic competitiveness.[121]

Investment in the Future

A recurrent theme in the Space Station discourse is the image of space expenditures as investments: As the 1998 *ISS Fact Book* puts it, the SSP's purpose is "to invest for today and tomorrow. Every dollar spent on space programs returns at least $2 in direct and indirect benefits." This funding

[119] Daniel Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1990).
[120] George Brown, "Thoughts on the Future of the Nation's Space Program," *Ad Astra* (January/February 1993), 43-4.

"[c]onstitutes a relatively small investment by the United States in terms of overall Federal spending while leveraging the total investment of all 16 participating countries."[122]

The investment image is used throughout the SSP discourse. A 1993 internal NASA document suggested that the "Space Station is an investment that will be used to enhance U.S. competitiveness and improve the quality of life on Earth."[123] Publicly, NASA officials have referred to the SSP and other assets as investments: Hans Mark in 1983 said that: "[The Space Station] will provide us with the capability to do things that cannot be done by anyone else who has not made the investment in the technology of the Shuttle and the space station."[124] Daniel Goldin said in a 1992 speech that "[t]he Space Station is an (sic) critical investment in America's future."[125] Goldin has further claimed that the SSP will produce high returns for a small input, stressing the return on the investment: "[t]he one percent of the federal budget-- and ¼ of 1% of GNP-- we invest in NASA is a vital investment in our nation's competitiveness."[126]

NASA is defined as an investment for its development of new technology. James Beggs said in 1982, "[T]he station would make a vital contribution to our Nation's future, by opening new vistas of science and

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[121] NASA, *Space Station Freedom: Gateway to the Future.*
[122] NASA, *ISS Fact Book 1998.*
[123] "Draft Space Station FY94 Themes. Document in Support of J. Dailey's Memo of 12 May 1993," (Washington: NASA Historical Collection, 1993).
[124] Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983).
[125] Daniel Goldin, "Dayton Air Show, Dayton Ohio," (Washington: NASA Historical Collection, 1992).

technology, new possibilities for commercial applications of space, and new opportunities to enhance economic security and the national defense."[127] James Beggs described NASA as an "investment strategy" for the development of new technology.[128] In a later publication, Beggs wrote, "there is a growing realization that the national investment in the type of research and development that NASA does so well is more than worth it. The payoffs include new industries, new jobs, new products, new knowledge and a new spirit of national pride." In the same article Beggs stressed the enormous unpredictable benefits associated with space: "Indeed, many have argued that the single transfer of NASA-developed communications satellite technology alone could suffice as payoff for our entire expenditures on the space program to date."[129]

James Beggs wrote in 1984, "[T]he space station will play a role in helping to nurture and revitalize American technology. Economic prosperity in a competitive world depends upon productivity. Traditionally, investments in NASA, by focusing upon research and technology, have contributed to U.S. productivity. NASA alone cannot assure our competitiveness, but the agency's programs can be- and I believe must be- an element in the nation's investment strategy."[130]

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[126] Daniel Goldin, "Aerospace States Association," (Washington: NASA Historical Collection, 1992).
[127] Beggs, "Why the United States Needs A Space Station..."
[128] James Beggs, *Space Station: The Next Logical Step* (Washington: NASA, 1984), 1.
[129] Beggs, "Why the United States Needs A Space Station..."
[130] James Beggs, *Space Station: The Next Logical Step* (Washington: NASA, 1984), 1.

Thomas J. Murrin, Deputy Secretary of Commerce, told the Augustine Committee in 1990 that "[w]hile space missions may uplift our spirits and enhance our prestige, it is economic competition which will, ultimately determine our standard of living, the jobs that we and our children hold and, to a large extent, our national security and international influence. The potential for space activities to enhance our economic progress will directly affect this nation's ability- and its will- to continue to be a permanent leader in the world."[131] The technology developed for and by the Space Station would be on the cutting edge in the field and provide an advantage over rivals by "increasing the bank of science and technical data that keeps American industry competitive and aggressive and nourishes the free enterprise system."[132]

Science and technology development is a major component of the space policy discourse. Specific examples of technologies or products spun off the space program to other sectors are used to bolster the image that space benefits the broader society and is in fact an investment vital for the country's technological and economic future.[133] Technologies developed from new space projects are identified as improving the trade competitiveness of the U.S. economy, as long as the investment continues.[134]

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[131] Quoted in, Advisory Committee on the Future of the U.S. Space Program, *Report of the Advisory Committee on the Future of the U.S. Space Program* (Washington, DC: U.S. Government Printing Office, 1990).
[132] David 1988.
[133] NASA, *Aerospace Spinoffs: Twenty-Five Years of Technology Transfer* (Washington: NASA, 1988).
[134] Franklin D. Martin and Terence T. Finn, *Space Station: Leadership For the Future* (Washington: NASA, 1987); NASA, *National Aeronautics and Space Administration: Twenty-*

This language extends beyond NASA; other actors have adopted the investment image. President George H. Bush described the Space Station as "an investment in the growth, prosperity, and technological superiority of our nation."[135] Improved economic performance would strengthen the entire nation and bolster its power in the world. Space expenditures are promoted as expanding the U.S. technology base and producing a greater dollar-value return than they cost.[136] Bush's Vice President, Dan Quayle, noted that "[o]ur future competitiveness will depend on developing advanced technology. It will depend on educating our young people for excellence in math and science. And the space program is a sound investment in ensuring that these key aspects of American competitiveness are there when we need them."[137] In Congress, George Brown stated in 1991 that "[t]hose of us who believe in a robust space program have to convince the American people that such a healthy investment in space would bring healthy returns to the U.S. economy."[138]

Because of its impact on S&T development, the SSP and other space activities were offered as a substitute for military spending: "investing in space

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Fifth Anniversary, 1958-1983, (Washington: NASA, 1983); NASA, *Commercial Use of Space: A New Economic Strength For America* (Washington: NASA, 1989).

[135] George Bush, "Remarks on the 20th Anniversary of the *Apollo 11* Moon Landing, July 20 1989," In *Public Papers of the Presidents of the United States: George Bush 1989. Book II, July 1 to December 31, 1989* (Washington: U.S. Government Printing Office, 1990), 990-3.

[136] David 1988;

[137] Daniel Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1990).

[138] George Brown, "NASA and the Civil Space Program: Reflections on Past, Present, and Future Issues," *Space Times* (March-April, 1991), 7-10.

is especially important in light of the decline in our military spending."[139] As Cold War military expenditures fell after 1990, the SSP was presented as an alternative means to promote the high technology sector: "As defense spending goes down, it's vital that we maintain our aerospace expertise and technology so as not to lose our edge against other countries. The civil space programs of NASA offer the chance to do that."[140] NASA programs, like the SSP, offer a peaceful, politically acceptable way to channel billions of dollars into high technology sectors and firms.

The image extends to Space Station benefits, for investments should ideally produce dividends. The concrete benefits derived from NASA programs are described in such financial terms: "Research equipment developed for the Space Station is already paying dividends on the ground" as previous NASA projects continue to benefit society, "Medical equipment technology and miniaturization techniques developed for the early astronauts are still paying off today, 30 years later."[141] NASA Administrator Richard Truly claimed in 1991 that "Some of the technologies and systems driven by Space Station Freedom and will therefore *pay dividends* on Earth are environmental control and life support, power generation, thermal control, health care, [and] data processing..."[142] As NASA Administrator Goldin said before Congress in 1994, the SSP was "a

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[139] Daniel Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1990).
[140] Daniel Goldin, "Aerospace States Association," (NASA Historical Collection, 1992).
[141] NASA, *ISS Fact Book 1997* (Washington: NASA, 1997).
[142] US Congress, House of Representatives, Committee on Science, Space, and Technology, *Impact of the Space Station Cancellation* (Washington: Government Printing Office, 1991), 45.

priceless opportunity to equip America for the 21st century" [with] "humanity's *greatest resource*," space.[143] While the economic value of spin-offs is debatable, they have been touted as proof of the economic "return" from the money "invested" in space; the Space Station was not a financial output according to this view but an investment that will produce future gains.

Although the U.S. is usually referred to as the prime beneficiary, in certain settings broader gains are suggested. James Beggs in Japan (1985): "Our international partners on the Space Station will share in that bounty. Over time, the benefits they will reap will far outweigh the costs of their investments."[144] The US role in the Space Station is highlighted in the NASA literature when the economic benefits are discussed: "As principal investor, the United States is the senior partner."[145] This has the effect of ensuring that the economic benefits of the SSP are closely tied to the US economy and reassuring the audience that the "international" partnerships will not unduly enrich foreign economies at America's expense. Despite cooperation, the US position is enhanced vis-à-vis other actors.

Many of the technological developments proponents associate with the SSP were closely connected to space exploration itself, although others have

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[143] US Congress, House of Representatives, Committee on Science, Space, and Technology, *1995 NASA Authorization (Space Station: Parts 1 and 2)* (Washington: Government Printing Office, 1994), 39.
[144] James Beggs, "Remarks Prepared For Delivery to Keidanren (Federation of Japanese Economic Organizations)," (Washington: NASA Historical Collection, 1985).
[145] Andrew Stofan, *A Research Laboratory in Space*, (Washington: NASA, 1987).

broader applications.[146] The application of spin-offs would create new industries. The commercial satellite industry is cited as an example of how a totally new business could be created from space technology. Communication satellites began as a government provided service and has been gradually privatized. The success of private sector satellite services provides and analogy for possible future commercial developments.[147]

Creation of Jobs

A major domestic policy argument was the value of the SSP for job creation, especially in key electoral states of California, Texas, and Florida. During the economic recessions of the 1980s and 1990s, unemployment in high technology sectors was a major political issue. The SSP promised employment of workers in private sector contractors and in the various NASA centers working on the project.

The association between the SSP and jobs has several levels. Initially, the input of funds for the development and construction of the SSP would be a great boon to the aerospace industry. Additional jobs would be created throughout the technology sector. The promise of new jobs became a virtual good that would be lost should the SSP be cancelled. Advocates warned of a threat to high-tech jobs if the Station project was canceled: "This is basically an amendment to kill 75,000 high-tech jobs in this country," Rep. Robert Walker

[146] NASA, *Space Station Freedom: Gateway to the Future*.

(R-PA) in floor debate in House July 1992.[148] A lack of growth in NASA's activities threatened a reduction of jobs. In a press release discussing the number of jobs at Johnson Space Center (JSC) connected to the SSP, the NASA press officer projected 1000 additional jobs at JSC and noted that "without the Space Station program, JSC's employment level likely will not grow significantly over the next few years."[149]

It is with this form of argumentation that the Space Station debate most closely resembles traditional "pork barrel" politics. Supporters of space expenditures point out that NASA's budget is not spent "in space" but "right here on earth."[150] In a House floor debate, Representative Mel Levine (D-CA) commented, and was approvingly cited by NASA in the *Station Break* newsletter, "Let me remind my colleagues that the money used to build the space station is not being sent into orbit. It is being spent here on planet Earth-- creating highly skilled jobs-- 78,000 of them so far, and putting money into communities in 40 states."[151] Indeed, the distribution of contracts and spending to in all parts of the United States is routine and expected.

A second level to the employment argument is the ripple effect in the general economy. The expected advances in technology were also described as producing needed high-tech jobs. According to 1998 *Fact Book*, the SSP

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[147] Hans Mark, "The Space Station-- Mankind's Permanent Presence in Space..."
[148] James R. Asker, "Space Station Survives Floor Fight In House, But Opponents Gain Ground," *Aviation Week and Space Technology* (3 August 1992), 24.
[149] NASA, "Space Station Will Increase JSC Manpower Level," (Washington: NASA, 1986).
[150] Grumman 1971, 16.
[151] "House, Senate Vote For Spending Funding," *Station Break* (September 1991), 2.

"Provides needed, quality jobs for American workers, and creates a wide range of new career opportunities for today's college and graduate school students."[152] The Space Station is described as opening up new opportunities for employment and "more jobs through national investment in high technology."[153] NASA's overall activities touched many different sectors and were explicitly linked to employment. A study for the agency by the NASA Alumni League claimed that various NASA programs created 300,000 jobs.[154]

The SSP being a vital program for NASA is therefore a vital program for the NASA-driven part of the economy. Therefore, according to this view, money spent on space programs ripple out into the overall society. It is not spent but rather directed: "Every dollar invested in NASA creates jobs-- in NASA, its contractors, and in the many spin-off industries that have applied NASA research and technology. These are all high quality jobs-- the kind that are the envy of the world."[155] The relationship between high technology investment and jobs is described as a positively reinforcing feedback loop: investment in high tech projects creates employment to create the project and then new knowledge creating additional job opportunities. Senator Barbara Mikulski (D-Md.), a major Space Station advocate, equated space activities and jobs in a classic formulation: "I truly believe that in Space Station Freedom we are going

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[152] NASA, *ISS Fact Book 1998*.
[153] NASA, Office of Space Station, "The Space Station: A Description of the Configuration Established at the Systems Requirements Reviews (SRR)," (Washington: NASA, 1986).
[154] NASA, "NASA Programs Generate More Than 300,000 Jobs, Study Shows," (Washington: NASA, 1989).

to generate jobs today and jobs tomorrow- jobs today in terms of the actual manufacturing of Space Station Freedom, but jobs tomorrow because of what we will learn."[156]

NASA promotes the SSP by explicitly linking it to employment: "A Space Station will stimulate technology resulting in "spin-offs" that improve the quality of life for people everywhere. A Space Station will create jobs and maintain our nation's skilled industrial base."[157] James Fletcher wrote to Senator Patrick Leahy in 1988 to defend the SSP expenditure:

> The Space Station is an expensive undertaking, but it is money well spent. besides the fact that the Space Station is the key to the U.S. future in scientific, technological, and commercial exploration and exploitation of space, it has been our observation that dollars spent by the U.S. Government in the aerospace industry have benefited the economy with a multiplier effect of about seven. Thus, each dollar spent on the Space Station can be expected to result in a many-fold impact on the gross national product. This effect translates into more prosperous U.S. economy. It also means jobs for Americans, about 52,000 in the aerospace industry throughout the U.S. when the program reaches its peak funding years in the early 1990's.[158]

The connection between space and high technology jobs is so close that when Russia was invited into the SSP, Daniel Goldin made a point of stressing that American jobs were not in jeopardy and emphasized the need to plan

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155 Daniel Goldin, "Aerospace States Association," (Washington: NASA Historical Collection, 1992).

156 Quoted in, Roger Launius, *NASA: A History of the US Civil Space Program* (Malabar (Florida): Kreiger, 1994), 123.

157 NASA, *Information Summaries: Space Station*, (Washington: NASA, 1986). The same sentence is included in, NASA, John F. Kennedy Space Center, *NASA Facts: Space Station*, (Washington: NASA Historical Collection, 1986).

ahead: "Russian participation will not have a significant impact on U.S. jobs. There will be areas where we rely on proven Russian systems. But joint developments will provide enhanced technology to U.S. companies and will lead to new jobs... Our children's future should dominate our thinking, not our near-term concerns."[159]

Economic Benefits: Discussion

The recurring image of space as an investment in the future has several dimensions. First it is clearly a means of persuasion, warning doubters that to hesitate in the space endeavor will engender unforeseen costs to future generations of Americans. It is also an important rhetorical device used to sell costly programs. Economic growth fueled by technology is a widely accepted feature of modern Western societies. The economic booms created by the industrial and computer revolutions are part of American cultural mythology and Americans clearly associate technology with economic growth. The investment image gives a material edge to the platitudes of Space Station advocates and balances the symbolic and esoteric arguments discussed above. When speakers or writers can point to specific benefits (such as telecommunications), claims that space expenditures are a means to greater social betterment sound more valid.

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[158] James Fletcher, "Letter From James Fletcher to Patrick Leahy," (Washington: NASA Historical Collection, 1988).

However, the key value of all of these developments was national power. The technical and commercial applications are inputs into the nation's economic competitiveness. It is this competitiveness that links S&T and national interests. There are appeals to America's sense of itself as a leader in economic growth and innovation, alluding to the nation's pride: "American's don't just meet the future; we shape it."[160] Actions taken now are key to the future: "I am convinced that America must start to prepare today for a new century in which aeronautics and space will play an even greater role in our national economy."[161] The ultimate economic value of the SSP is its contribution to global competitiveness: "A Space Station will improve our country's competitive stance at time when more and more high technology are being purchased overseas."[162]

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[159] Daniel Goldin, "Statement by Daniel S. Goldin, Administrator, National Aeronautics and Space Administration, on the Cooperative Agreement Between the United States and Russia on Space, Aeronautics and Science," (Washington: NASA, 1993).
[160] Daniel Quayle, "Prepared Text of Remarks by the Vice President. Vandenberg Air Force Base, California," (Washington: NASA Historical Collection, 1991).
[161] Daniel Goldin, "Keynote Address, Goddard Memorial Dinner," (Washington: NASA Historical Collection, 1992).
[162] NASA, "NASA Facts: Space Station."

"America's Foothold on the Future:" The Space Station as Social Progress

The Future of Society

The uncertainty of projected Space Station economic benefits was recognized and the Project was not justified solely on its economic merits.[163] Social progress and the future of society are key themes in the SSP discourse.[164] Ronald Reagan said in 1984, "a space station will not be an end in itself but a doorway to even greater progress in the future."[165] The SSP is described as a legacy to future generation, "a keystone. Without it, we cannot build the arch that joins the present to the future."[166] This future is one of growth, change, and optimism: "we cannot continue to expand into space without continuing to grow as human beings."[167]

In the late 1980s NASA official James Odom spoke of the SSP in these terms: "The Space Station is about the future. It is a future that belongs to those who prepare for it... The future in space can belong to us in this country."[168] The implication here is that cancellation of the project would cheat

[163] One NASA document noted: "Since few of these benefits can be qualitatively assessed, it is not reasonable at this time to justify a Space Station on economic grounds alone." (*The Economic Effects of a Space Station: Preliminary Results* (Washington: NASA, 1983), 1).
[164] NASA, *Space Station Freedom: Gateway to the Future.*
[165] Ronald Reagan, "Radio Address to the Nation on the Space Program," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1984, Book I, January 1 to June 29, 1984*, (Washington: US Government Printing Office, 1986), 108.
[166] James Fletcher, "Excerpts From Remarks Prepared For Delivery: NASA Press Briefing; Kennedy Space Center," (Washington: NASA Historical Collection, 1988).
[167] James Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England," (Washington: NASA Historical Collection, 1984).
[168] Quoted in, NASA, *Space Station: A Research Laboratory in Space* (Washington: NASA, 1988).

future generations out of their birthright. George Brown spoke in similar terms in 1992: "There is no more sense in arguing that we must choose between social programs and science programs for the nation than there is in arguing that a family must choose between buying food and paying for the education of its children."[169] The space program is therefore linked to the *national* future. Future generations are the non-present recipients of these benefits, and the nation need this investment just as family needs to plan both for today and for its children.

These arguments connect the SSP and the space program to resolution of social problems and to broad societal betterment. The imagery of societal progress embraces the entire world as well as the US, as James Beggs noted: "Continued exploration and development of space holds the promise of a new era of progress, peace and prosperity for all mankind. I believe that promise is unlimited. If we can preserve the peace and build on the existing foundation of international understanding and cooperation on earth and in space, we will have the opportunity to build an enduring world order- a golden age such as history has never seen."[170]

As we have seen before, there is a sense of urgency; decisions made today will shape the future: "The decisions we make in this decade for space will set the nation's course for decades, if not centuries to come. The legacy we

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[169] George Brown, "Remarks by the Honorable George E. Brown, Jr. at Space Studies Board Symposium on Setting Research Priorities," (Washington: NASA Historical Collection, 1992).
[170] Beggs, "The Wilbur and Orville Wright Memorial Lecture."

leave to future generations may well be decided in these next few years."[171] Andrew Stofan wrote in 1988 that "[t]he Space Station is important because it is about the future… What we are doing now... is preparing for the future… The Station will be the centerpiece of our future activities in space."[172]

National Pride

Another set of arguments claim that American national morale and sense of national greatness are enhanced by the SSP. As van Dyke (1964) noted, national pride has been a theme of space discourse from the very beginning.[173] The NASA Transition Team Report from 1980, written by old NASA hand George Low, defined national pride as "how we view ourselves. Without a national sense of purpose and identity, national pride ebbs and flows in accordance with short term events... The space program has characteristics of American historic self-image."[174] Apollo provides the classic example of American pride in its space program. A book commemorating the twenty-fifth anniversary of NASA proudly noted that, "*all* the footprints ever made on the

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171 Daniel Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1990).
172 Andrew Stofan, *Space Station: A Step into the Future*. (Washington: NASA, 1988).
173 Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).
174 George Low, "George M. Low, Team Leader, NASA Transition Team, to Mr. Richard Fairbanks, Director, Transition Resources and Development Group, December 19, 1980, With Attached: 'Report of the Transition Team, National Aeronautics and Space Administration'" NASA [On Line], http://www.hq.nasa.gov/office/pao/History/low80.html, 4.

moon were American-made."[175] Apollo 11 anniversary celebrations continue to be major public and media events.

Likewise, the SSP is presented as a new source of national pride: "a Space Station will be a source of pride for all Americans and a visible symbol of our nation's ability to carry out complex scientific and engineering endeavors."[176] Through the Space Station, "[p]ride in country will be realized."[177] Andrew Stofan wrote in 1987: "The space program has provided a new dimension to the human adventure and it has instilled in Americans a deep sense of pride. In the 1990s the Space Station will continue and enhance this legacy. As a facility and laboratory in space, its value is extremely practical yet powerfully symbolic. As a program it is about to move into a critical stage. Now more than ever, the Space Station is important to our future and we must move forward as planned."[178]

National pride can also be harmed when projects are canceled, a theme used by James Fletcher in a 1988 speech: "The fact is that the American civil space program-- *your space program*-- and the source of so much American pride, prestige, and scientific and technological progress, faces a crisis unparalleled in its lifetime" because of proposed budget cuts. "It is not a pretty prospect to imagine the United States as a second-rate, or even third rate

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[175] NASA, *National Aeronautics and Space Administration: Twenty-Fifth Anniversary, 1958-1983* (Washington: NASA, 1983), 8. Emphasis original.
[176] NASA, *Information Summaries: Space Station* (Washington: NASA, 1986). The same phrase is used in NASA, *NASA Facts: Space Station*.
[177] TRW, *The Next Step: Manned Space Station* (TRW, 1982).
[178] Stofan, *Space Station: The Next Logical Step*.

power in space. But that is what this country will quickly become if Congress doesn't act responsibly and give NASA the resources it needs to do its job."[179] The shame of being less than "number one" is the reverse side of national pride in great accomplishments.

These benefits are recognized to be indirect and largely psychological; they would be the intangible influences rather than a specific task the Station would perform. This is the most abstract and problematic set of arguments discussed so far, largely because the claims are difficult if not impossible to prove or discount. For example, how can national morale be measured? It is also difficult to separate purely rhetorical arguments of this type from genuine beliefs; elements of both are clearly present. This makes criticism of such arguments difficult, as critics cannot discount national pride or disprove the space program's influence on it.

Inspire Education in Science and Technology

In promotional literature, the SSP is translated into a means of educational progress. "Space Station Freedom will stimulate the interest of youth and encourage them to study science, math and engineering, and influence teachers who view space as a learning tool."[180] Supporters of the SSP claim the project will inspire young Americans and "[s]timulate interest in

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[179] NASA, "NASA Administrator Sounds Alarm on Proposed Budget Cuts," (Washington: NASA Historical Collection), 1988. Emphasis added.
[180] NASA, *Space Station Freedom: Gateway to the Future.*

scientific and technical education."[181] The 1998 *ISS Fact Book* states: "Space Station serves as a virtual classroom in space to the benefit of teachers and students alike."[182] Daniel Goldin, in several of his speeches described how he himself was inspired by John Kennedy and Apollo to pursue a career in engineering. Space is presented as a means to generate interest in science: "What a powerful way to teach our kids. What a great example of the effect our space program can have on education!"[183] James Beggs noted that space "is inspirational to children," a point he pressed upon Ronald Reagan in the early 1980s.[184]

Raising interest in science is important for economic reasons: "We need these professionals: In 40 years, 45% of our national economic growth has resulted from the technology they provide."[185] The investment argument returns when space is linked to education. The academic study of science and engineering is needed to "inspire a new generation of Americans to explore and achieve, while pioneering new methods of education to teach and motivate the next generation of scientists, engineers, entrepreneurs, and explorers" all of whom are essential to the national future.[186] "Like our early space adventures, Space Station Freedom will stimulate the intellectual curiosity of our inventors, scientists and manufacturers and inspire the dreams of our most valuable

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[181] Stofan, *Space Station: The Next Logical Step.*
[182] NASA, *ISS Fact Book 1998.*
[183] Daniel Quayle, "Address Before Johnson Space Center Employees," (Washington: NASA Historical Collection, 1990).
[184] James Beggs, Interview With Author, 22 July 1999.
[185] TRW 1982.

resource- our youth."[187] The Space Station furthers social progress by stimulating young minds to think of science and engineering- ensuring the future.

American Youth

Beyond education is the sense that the space program, represented by the SSP, is an essential part of the future of young Americans. An interesting element of this argument is the appeal to the interests of young (or unborn) Americans. The defense of the SSP offered in a 1991 House hearing embodied this notion. SSP funding had been cancelled by the VA-HUD/Independent Agencies Appropriations Subcommittee. NASA officials, sympathetic members of Congress, and the Bush Administration rallied to the Station's defense. Administrator Richard Truly told Congress that to cancel the Space Station would be a great loss to America's future, beyond the costs the present would suffer.[188] Richard Darman of the Office of Management and Budget (not normally an agency promoting government spending) told the same panel that the proposed cancellation of the SSP would cheat "future generations" of their prosperity.[189] Representative George Brown (D. CA) opened the hearing by

[186] NASA, *ISS Fact Book 1997*. (Washington: NASA, 1997).
[187] NASA, *Space Station Freedom: Gateway to the Future.*
[188] US Congress, House of Representatives, Committee on Science, Space, and Technology, *Impact of the Space Station Cancellation* (Washington: Government Printing Office, 1991).
[189] US Congress, *Impact of the Space Station Cancellation*.

reversing the question of the Space Station's price: "Can we *afford not* to build the Space Station?"[190]

Responsibility to future generations is a special form of this argument. In an interview shortly after assuming the office of Administrator, Goldin explicitly linked the space program to the well-being of future generations: "Our children's children will look back at us for being the most selfish generation in the world if we don't move forward."[191] Goldin noted in 1992 that "[d]uring my half-century of life people have consumed more of the world's resources than during all prior generations in human history. We've already used up more than we deserve, and now we're stealing from the future. What will earth have left in 50 or 150 years? The ¼ of one percent of GNP we invest in NASA has to be considered the most important insurance policy this planet has."[192]

Goldin's speeches frequently mention the need to prepare for the future on behalf of those who will live it. In another 1992 speech, Goldin made two such statements: "We owe it to future generations to take the time to look at our own planet and to better understand how human beings may be affecting it." Later in the same speech, he commented "Tonight throughout America, the first

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190 US Congress, *Impact of the Space Station Cancellation*.

191 Goldin, "The Goldin Interview"; see also, Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future, Remarks at the National Press Club," (Washington: NASA Historical Collection, 1994).

192 Daniel Goldin, "Remarks by Daniel Goldin NASA Administrator American Institute for Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1992).

Martians are being tucked into bed after a tough week at school."[193] The message is clear: the future requires action now.

In 1993 Brown put the issue of the space program in generational terms: "[w]e must understand our real reasons for a space station. The space station is a step in the LONGER-TERM process of being good ancestors. First, we must pass on to future generations a planet that is unharmed and hopefully enriched by the knowledge gained from Space for the benefit of its inhabitants. But we must also extend the path for humankind to follow its instinct to explore the farthest frontier."[194] The space program, represented by the SSP is an "insurance policy" for future Americans.

Similar language was used by Daniel Quayle, "it is to America's youth that we must ultimately answer. What will we say to the young man I met at the U.S. Space Camp a few months ago who told me he wanted to plant the American flag on Mars? What will we say to our students who dream of shores unseen and vistas unknown? Will we tell them we were afraid even to take the first steps?"[195]

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[193] Daniel Goldin, "Keynote Address, Goddard Memorial Dinner," (Washington: NASA Historical Collection, 1992).

[194] George Brown, "A National Space Program: Redefining the Future: Remarks By The Honorable George E. Brown, Jr. At The National Space Club," (Washington: NASA Historical Collection, 1993). Emphasis Original.

Space Station and Social Progress, Discussion

In an interview with the author, Beggs noted that, "the human spirit does seem to want to reach out."[196] In the space policy discourse, prosperity and progress require more than technology. Imagination and social freedom are cited as equally important for the creation of progress.[197] James Beggs said in 1985 that "[t]he future holds great promise. Given human ingenuity, human imagination and the age-old human quest for new knowledge, our achievements could surpass even our wildest dreams today... Indeed there is no limit to what free people can achieve because freedom is humanity's most precious resource. It allows us to think, to explore, to dream and to transform our dreams into reality. Americans and free people everywhere would have it no other way. And this is why we will continue to grow and prosper."[198]

Looking forward to the future allows speakers to denigrate opponents as short sighted: "Now the needed funds are in danger of being cut by *doubters* in the Congress. *Doubters* who think we should live within our *known* limits, instead of expanding our horizons. Doubters who believe that mankind's destiny is forever anchored to a single planet. Doubters who scoff at America's investment in space-- which is an investment in the future."[199]

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[195] Daniel Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1990).
[196] James Beggs, Interview With Author, 27 July 1999.
[197] Beggs, "The Wilbur and Orville Wright Memorial Lecture..."
[198] James Beggs, "Remarks Prepared For Delivery to Keidanren (Federation of Japanese Economic Organizations)," (Washington: NASA Historical Collection, 1985).
[199] Daniel Quayle, "Address Before Johnson Space Center Employees," (Washington: NASA Historical Collection, 1990), 4. Emphasis original.

Although the SSP is described as the key to future in space, the future is not pre-determined.[200] There is an element of choice in these matters. These acts are choices and important choices that cannot be deferred. Daniel Quayle stated in 1990, "As a nation we need to decide whether we will hesitate, or step boldly in space exploration."[201] Urgency is again a feature of these arguments: "We've waited long enough. To keep the next generation of benefits from space flowing back to Earth, America must have a permanent presence in space. We *need* Space Station Freedom, and we need it *now*."[202]

Linking Past and Future with Historical Analogies

Space policy advocates often use historical analogies as a means to advocate or justify space expenditures. The use of such analogies grounds the space program in reality by creating links to a commonly held past. Analogies specifically links space colonization to American history and to the entire heritage of American cultural mythology. Analogies are of two types: positive, which give examples of behavior worthy of behavior, and negative, which are used as ancestral warnings.

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[200] Terence Finn, *Space Station Program History: 1981-1987* (Washington: NASA Historical Collection, 1988),. Slide OSSTT 39G.
[201] Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics."

The Positive Analogies: Exploring and Pioneering Space

Efforts to associate space (the future) and history (the past) are widespread in the NASA literature. The first important historical analogy that appears in the SSP literature is the colonization of the American continent by European pioneers. The settlement of the "New World" and West are important parts of the American mythos and has strong emotional appeal. American history provides many allusions and heroes for space advocates to embrace. "We are a pioneer nation. We developed and built out country largely because of our people's basic urge to explore and known the unknown."[203] The Pilgrims, Lewis and Clark, and the pioneer wagon trains are the concrete figures that appear in this analogy.[204]

References to space as a "frontier" are common throughout American public discourse on space.[205] Notably, John F. Kennedy explicitly tied space to his Administration's slogan, "The New Frontier."[206] Senator Jake Garn, who was an astronaut on Space Shuttle mission 51-D, told his colleagues, "[Space]

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[202] Daniel Goldin, "The Future in *Freedom*; The Future is Now, Remarks to the National Space Club," (Washington: NASA Historical Collection, 1994).
[203] James Beggs, "Suggested Remarks: South Bay Forum, Commonwealth Club of San Francisco," (Washington: NASA Historical Collection, 1982), 9.
[204] The private launch firm Space Services of America, Inc. named its experimental rocket *Conestoga* after nineteenth-century covered wagon (Nathan C. Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992).
[205] The idea of the frontier as defined by Frederick Jackson Turner, has been embraced by space enthusiasts, even though it has been largely abandoned by most historians (Howard E. McCurdy, *Space and the American Imagination* (Washington (DC): Smithsonian Institution, 1997).
[206] Byrnes 1994.

really is the frontier of our future."[207] When Ronald Reagan began the ISS program in 1984, he referred to the "pioneering spirit" of America.[208] America's historical legacy implies an equally impressive future for a nation of "doers."[209] Daniel Goldin made such an allusion in 1992: "The spirit that brought the pilgrims to Plymouth Rock, that wrote a democratic constitution, that tamed the West, and put a man on the Moon must carry forward into space."[210] Just as earlier pioneers created a new society on the "frontier," space pioneers will create a new civilization on the frontier of space.

The second positive analogy commonly employed links space programs to the voyages of Columbus and other European explorers.[211] This analogy is very common because it employs another key foundation myths of American culture. Christopher Columbus, Henry Hudson, and other explorers are the bedrock of history textbooks, making their names and stories well known to all Americans. A NASA booklet entitled *America's Spaceport* specifically linked the Kennedy Space Center with explorers who visited Florida in the past. "Yet, our leap toward the stars is also an epilogue to a rich and colorful past... an almost forgotten legacy replete with Indian lore, stalwart adventurers, sunken treasure and hardy pioneers. For the sands of America's Spaceport bear the imprint of

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[207] US Congress, Senate, Committee on Commerce, Science and Transportation, Subcommittee on Science, Technology, and Space, *Briefing by the Crew of the Space Shuttle Mission 51-D* (Washington: Government Printing Office, 1985), 29.
[208] Ronald Reagan, "Address Before a Joint Session of the Congress on the State of the Union," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1984 Book I, 1 January - 29 June 1984* (Washington: US Government Printing Office, 1986), 90.
[209] Krug 1991.

New World history from its earliest beginnings."[212] Similarly, Richard Truly's *Space Shuttle: The Journey Continues*, also compared the Shuttle to Vasco de Gama and James Cook.[213] This past reinforces the sense that America is a "new country," unique in being "discovered" and settled in recent history. Explorers, like pioneer and immigrant ancestors, are the heroes of historic drama; they provide a past that SSP advocates can appeal and refer to. This conceptualization of the past forms a template upon which a conceptualization of the future may be drawn.

The third historical analogy that space advocates offer is the history of aviation. This is a story of progress from the dreamers and pioneers (such as the Wright brothers) to the adventurers (such as Charles Lindbergh) to the evolution of modern air travel. The longer history of aviation also provides a broader context for the exploration of space. Allusions to aviation milestones help link the past to the future: "In less than the span of a single lifetime, we moved from the dunes of Kitty Hawk, through the sound barrier, to land on the moon."[214] The flight of John Glenn in October 1998 provided a "living analogy" both to aviation history and to the space program's own past. Analogies to the history of aviation allow advocates to reject criticism as shortsighted, and to

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[210] Quoted in, NASA, *The Power to Go Beyond: Indigenous Space Materials Utilization for Propulsion* (Washington: NASA, 1993).
[211] McCurdy 1997.
[212] NASA, *America's Spaceport: John F. Kennedy Space Center*, 1.
[213] Richard Truly, *Space Shuttle: The Journey Continue* (Washington: NASA, 1988). The use of this analogy is not restricted to the United States. ESA's contribution to the ISS is named *Columbus* and was originally intended for launch around 1992, the Columbus quincentennial.

claim that space will develop as naturally and as quickly as commercial air travel.

The fourth analogy that is used in the Space Station discourse is Antarctic exploration. The difficult and limited nature of Antarctic research early in the 20th century serves as an analogy to the early space age. Modern Antarctic bases represent analogies to the SSP.[215] "[J]ust as the airplane opened Antarctica to permanent human habitation, so will the Shuttle and the Space Station open space to a limitless range of opportunities as a permanent home for mankind."[216] The scientific nature of Antarctic exploration gives this analogy a kinder image. There were no wars, genocides, or environmental devastations in this history.

The Negative Analogy: The Chinese "Mistake"

Historical analogies play different roles, depending on whether they promise or warn. One particular analogy used in the SSP literature provides a warning. Some SSP advocates refer to a historical period not well known to their American audiences: the Chinese maritime expeditions of the 15th century.

Between 1403 and 1453, a Chinese eunuch named Chêng Ho, led a series of voyages in the South China Sea and Indian Ocean, reaching as far as

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[214] James Beggs, "Technology, Imagination, and Faith," In *Space Station: An Idea Whose Time Has Come*, Theodore Simpson, ed. (New York: Institute of Electrical and Electronics Engineers, Inc., 1984).
[215] Philip Culbertson, "Current NASA Space Station Planning."

East Africa. These missions made contact with local peoples and proclaimed the glory of the Middle Kingdom. A later emperor ended all funding of the expeditions. Several edicts issued over subsequent decades forbid the construction of vessels capable of oceanic voyages. China did not pursue contacts or trade with outsiders for centuries after this time. While the voyages of Chêng Ho were not exploratory or mercantile expeditions in the manner of later European sailors, they required sophisticated maritime technology and navigation skills. Chêng Ho's ships were large, multi-masted vessels with large crews and were far more sophisticated than contemporary European designs. However, European maritime and other technologies continued to develop and within a few centuries were far advanced of China.[217]

The end of the Chêng Ho expeditions represented a decision by China not to look beyond its shores. The Chinese "abandonment" of a technology and an exploration "program" is used as a warning to opponents of the US space program. James Beggs in 1984 linked the Chinese withdrawal from oceanic voyages to China's eventual decline to weakness and foreign domination in the 19th century. "History offers many trenchant examples of what happens when the urge to explore and the development of new technology are forcibly curtailed." Beggs warned that

> The conservative Confucian mandarins had won the battle to prohibit voyages of exploration and development of the technical means to

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[216] James Beggs, "The Wilbur and Orville Wright Memorial Lecture...," 2.
[217] Information for this section has been drawn from, Daniel J. Boorstein, *The Discoverers: A History of Man's Search to Know His World and Himself* (New York: Vintage Books Random House, 1983), 190, 199-200).

> carry them out. But in the process, they stunted the spirit of exploration and enterprise in China for centuries to come... a strong case can be made that their actions led ultimately to the domination of China by the Europeans in the 19th century and to the downfall of Chinese civilization. Hindsight makes it clear there is a lesson in all this that is self-evident, and one we dare not ignore.[218]

The parallel between Chêng Ho and the US space program is one of potential unmet. Daniel Goldin warned in 1992 that "[t]o those who say that Apollo was a one-shot deal, never to be repeated, that we've got problems to solve here on Earth, I say: 'Right now we risk making the same mistake as the Chinese emperors over 500 years ago... we cannot pretend the decisions we make today don't have historic consequences for the future.' "[219]

Dan Quayle used the same negative analogy in 1990. He compared the failure of China to explore with the foresight of Portugal and Spain:

> In 1453 a fleet of Chinese ships sailed all the way to Africa, trading, exploring, and advancing Chinese. But the Ming Empire had other priorities-- problems at home, pressing needs elsewhere. They recalled the fleet-- and they burned it. They wanted to bring an end to 'wasteful' exploring. And they wanted also to ensure that Chinese explorers would not be tempted to venture forth again for a long, long time. At about the same time China was burning its fleet, a small European nation's foresighted leader, prince Henry of Portugal-- now known as Henry the navigator-- sent ships up and down the coast of Africa... The question now facing the United States in space is which path to take with regard to the 'oceans' of the 21st century-- space?[220]

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[218] Beggs, "The Wilbur and Orville Wright Memorial Lecture...," 8. Hans Mark made almost identical remarks a few months before (Hans Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College," (Washington: NASA Historical Collection, 1984), 7-8.
[219] Daniel Goldin, "Remarks by Daniel Goldin NASA Administrator American Institute for Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1992).
[220] Quayle, "Prepared Remarks of the Vice President to the American Institute of Aeronautics and Astronautics," 2.

The use of this analogy is perhaps the most misleading of all those discussed thus far. In the discourse of these speeches, the Chêng Ho expeditions are transformed into "exploratory missions" in the modern mode rather than as historically situated events. Their termination is also directly blamed for a loss of "exploratory spirit" and energy associated with modern technology. The consequences are also drawn too sharply, for multiple causes contributed to the decline of China in the 19th century. However the use of this analogy is consistent with the others. The lesson of the Chinese "mistake" is that exploration is vital for the future of a nation. The present situation demands that the United States acts with foresight like Portugal or Spain rather than "unimaginative" Ming China.

Historical Analogies: Discussion

Historical analogies have a variety of functions: it represents the aspirations of its participants, it is a means to garner support from the public, and it provides a historical context within which to place the exploration of space. Symbols, however intangible, present and support concrete ideas and actions. The symbols employed by the space program in the US provide a context for exploration by tying the program to the past (both actions and effects). Identifying space flight with Christopher Columbus implies a future sequence of exploration or settlement to follow. The idea of progress ("the next logical step") is an important dimension to the use of historical analogies; the logical sequence of the past is reinforced by the perceived logic of the future.

The history of exploration provides tantalizing hopes for the future of space exploration. Many explorers of the past made unanticipated discoveries, a fact highlighted by the pro-space discourse. "Space acts as our inspiration-- our magnet. But like Columbus seeking a short-cut to China, what we find along the way pays more dividends than we could ever imagine."[221] The history of exploration also is used to claim that exploration is a human instinct. As Richard Truly phrased it, "Men and women are more than economic creatures and patriots. They are seekers after knowledge."[222]

Through these analogies, the progression from exploration to colonization is established historically as logical steps. In a 1982 publication, Philip Culbertson argued about the need for a permanent presence to garner the benefits of space: "The first explorers of our own Western frontier created the opportunity for new uses of the land, but that opportunity was not realized until settlers- farmers and miners- arrived to stay and work."[223] The implication of these analogies is that exploration is part of America's past and should be part of its future.

The most problematic aspect of theses analogies is that the history that is used is often incomplete. The facts used are chosen selectively and often

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[221] Daniel Goldin, "Dayton Air Show, Dayton Ohio," (Washington: NASA Historical Collection, 1992).
[222] Truly 1988.
[223] Culbertson, "Current NASA Space Station Planning."

trivialize events.[224] Specifically, the history of exploration and colonization on Earth is romanticized and sanitized.[225] Ronald Reagan compared the Space Shuttle to the Transcontinental Railroad without taking into account the brutal conditions under which the railroad was built.[226] The unpleasant details of war, genocide and conquest in the exploration and colonization of the Americas are too often politely overlooked in this context.[227]

Historical analogies are also overly simplified. China's fall from the pinnacle of civilization to the dark years of the 19th and 20th centuries has numerous causes that are equally, if not more significant, than a withdrawal from maritime trade and exploration. The settlement of new lands has usually been a long process with many stops and starts. The exploration and settlement of the American West was not initiated by scientific curiosity as much as by avarice, military ambition, and social displacement.[228] There are also technical reasons to suspect the simplicity of historical analogies. Columbus did not have to bring his crew's air supply with him; the American pioneers did not need to create a new habitat to survive, but to adjust to an

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[224] Patricia Limerick, "Imagined Futures: Westward Expansion and the Future of the Space Program," In *Space Policy Alternatives*, Radford Jr. Byerly, ed. (Boulder (Colorado): Westview, 1992).

[225] McCurdy 1997.

[226] Limerick 1992.

[227] It is possible that allusions to the romanticized narrative of American history may have a greater appeal to individuals educated with that version, as opposed to those younger Americans raised with a more critical view of American history. If this is true, and a great deal of study would be required to test this hypothesis idea, historical analogies may actually undermine support for the space program among the young.

[228] It is important to note that many settlers of the Americas were fleeing economic hardships, religious persecution, and political oppression. In addition, many million slaves and indentured laborers came to the Western Hemisphere with little or no choice in their migrations.

existing (and usually not radically different) environment.[229] Space exploration *is* fundamentally different from anything that has come before and traditional motivations for exploration and migration may not apply. A different agenda with different motivations must be created.

Commentary and Discussion

A recurring theme in the SSP promotional literature is the inability to predict future uses and benefits of the space program. "There will be other uses for the Space Station, perhaps some that we have not yet thought of;" "a variety of other things with high profit potential that we simply have not imagined yet, because we are just beginning."[230] The most important benefits, advocates claim, are underrated and impossible to predict:

> Now, you can find plenty of people who say, 'All those things could have been invented without NASA.' And they're *right*. The question-- the *big* question-- is *when*? We don't have smoke detectors because someone stood up on the floor of Congress and said, 'America won't be able to sleep at night until we invent a $15 smoke detector.' *We did all these things because NASA needed them* for the space program. All these inventions came about now-- not later-- because we followed our natural human instinct to explore-- and because America has the wisdom and courage to pursue its destiny in space.[231]

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[229] There are historical incidents that may be more applicable to space. Such alternative analogies include the colonization of the Pacific islands by Polynesian mariners in the first 500 years of the Common Era. The slow and difficult progress from island to island by tiny groups of people may be the best analogy to the colonization of space. This analogy was not commonly used by the writers/speakers examined in this study, perhaps because that history is not well known in Western societies. An exception is Mark, "The New Enterprise in Space...," 9-10.

[230] Beggs, "Remarks Prepared For Delivery to Keidanren"; James Beggs, "Remarks Prepared For Delivery at the Conference on International Business in Space," (Washington: NASA Historical Collection, 1985).

[231] Daniel Goldin, "Remarks by Daniel Goldin NASA Administrator Before the Aerospace Industries Association," (Washington: NASA Historical Collection, 1992).

In an important sense the promotion of the SSP is the selling of a dream. This is the ideal of a better, more prosperous future that has been a staple of utopian/futurist literature for centuries. A utopia driven by technology is a more recent development, as is the idea that utopia shall come from or exist in space. However, SSP advocates do not promise a perfect world but they do promise that improvements to the nation's economy, education, and everyday life will come from the Space Station. The key theme is the channeling of energy and talent for a broader end. The SSP is described as an engine of prosperity and progress. Pro-SSP arguments claim that the US will be better off with a space station and will face a negative future without one. A promise is often an implied threat and SSP advocates warn of dire consequences to the nation's prosperity and pride if the Space Station is not built.

Although national wealth and a skilled educated work force are elements of national power, the discussion so far has had a domestic focus. Arguments have been limited to those with a domestic flavor, as the activities to be conducted on the Station are translated into domestic benefits first. The sequence envisioned has scientific experiments yielding new knowledge that boosts the domestic economy; improved global competitiveness flows from this. The next chapter shall continue this discussion by bringing in those arguments associated with foreign policy.

CHAPTER SEVEN

PROMOTING THE INTERNATIONAL THE SPACE STATION II:

US FOREIGN POLICY GOALS

> Every major advance in technology... has had a significant and often decisive impact on relations between nations. We cannot ignore the real likelihood that this will also be true in space.
>
> James Fletcher (1971)

> For all its benefits, loss of the Soviet threat deprives the US civilian space programme of arguably its single most vital propelling force.
>
> Kenneth S. Pedersen (1992)

In the previous chapter, we examined the domestic policy arguments offered on behalf of the Space Station Project. The arguments discussed so far have focused on the SSP as a bridge to new space activities and the source of domestic economic and social benefits. Many of the arguments presented in the previous chapter (especially those embodying S&T) are tinged with elements of foreign policy. The domestic level arguments made about economy and progress make clear the bridge between concepts of national power and competitiveness. The direct associations made between the SSP and foreign policy will be the primary concern of this chapter. These associations will be examined through a second set of arguments that connect directly with the promotion or service of US foreign policy interests. Foreign policy arguments embody existing US policy concerns, factors that may enhance US power, the relationship between the US and other countries, and symbolic politics.

While foreign policy has constantly been applied as a political rationale for the SSP throughout its torturous history, specific arguments have fluctuated greatly. Some arguments were used consistently from the beginning of the project and with minor modifications, continue to be used. In other cases, arguments shifted to reflect changing US foreign policy goals. Overall, the foreign policy rationale of the SSP most consistently embodied notions of national power and enhancing the reputation of the United States.

As discussed in chapter 5, the momentous changes of 1989-90 were felt in the SSP and throughout NASA. The policy discourse surrounding the SSP evolved dramatically during this period as the focus of the program shifted from the Cold War paradigm to the untested waters of the "New World Order." To take these factors into account, this chapter is divided into three parts. The first shall examine those arguments that appear across time (1980 to 1998). The second shall discuss the Cold War period (1980-1990), while the final part shall examine the post-Cold War era (1990-1998).

Arguments Appearing Across Time (1980 to 1998)

The Space Station as a Means of International Competition

Even in a peaceful world, states compete in many ways. In science and technology projects competition has been multi-faceted, embracing political, military, and economic affairs, although national power has been a dominant theme. However, national power is a notoriously difficult concept to quantify. S&T projects are an efficient way to measure relative capabilities of states and societies, due to the complexity of management and execution. As former NASA official John Hodge put it: "There are few ways to measure differences between countries- large high-technology programs is one way of doing so."[1] Space activities are a "more politically acceptable way for a democratic country to demonstrate its power to the world than military parades down Pennsylvania Avenue."[2] When discussing competition from the Soviet Union, speakers often echo the language of the "space race" of the 1960s. Political competition between the US and the Soviet Union in the Cold War was broad-based and the "space race" was a key measuring devise that was used to judge which side was "ahead." However, competitive fears were not restricted to the USSR. American allies were and are also competitive threats. One of the fundamental foreign policy arguments offered on behalf of the SSP is that "[s]pace has become competitive."[3] The fact that other nations are active in space is presented as a warning: "The United States is not alone in its attempts to tame space. Many nations see a bright future in exploring the space frontier for world prominence, national strength and commercial profit."[4]

International competition is commercial and comes from many countries. Even during the Cold War economic competition was identified as coming from

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[1] John Hodge, Interview With Author, 4 June 1998.
[2] Dwayne A. Day, "Paradigm Lost," *Space Policy* 11:3 (August 1995), 156.
[3] John Hodge, *A Space Station For America* (Washington: NASA, 1985),.No Pg.

the states of the European Space Agency (both collectively and individually), Japan, and China. India and Brazil are also occasionally identified as emerging space competitors.[5] There are frequent references to economic competition from America's allies, Japan and Western Europe. International competition has also been used in a more generic fashion, as a warning about the activities of other states in space and how they challenge the US at different levels of intensity.

When used broadly in this manner, competition means that the US can not defer space exploration: "[u]nfortunately, we're not the only country on earth and we're not the only country which realizes that this is a race and the race is to the swift."[6] NASA publications assert that an aggressive space program is needed to show American determination to meet the challenge of other states in space.[7] Should the US fail to do this, it would send a signal to other states that would encourage competition. Such signs of "weakness" are described as "dangerous" to space advocates. In 1983 James Beggs said that "In the last decade we may have been sending the wrong message to the world and that may be one of the reasons that they're competing as they are."[8] Each

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[4] Leonard David, *Space Station Freedom: A Foothold on the Future* (Washington: NASA, 1988), 3.
[5] Philip Culbertson, "Space Station: The Next Step in Space?".*Air and Space* (Spring 1983), 12; NASA, "Space Station Impact If Funding Were Cut" [Covered With Note From James Fletcher to Richard Darman], (Washington: NASA Historical Collection, 1989), No Pg.
[6] James Beggs, "Before the National Aeronautics and Space Administration West Coast Dinner," (Washington: NASA Historical Collection, 1983), 14. In this speech Beggs critiqued Senator William Proxmire's frequently remark that the planets would be available for exploration for millions of years.
[7] David 1988, 4.
[8] Beggs, "Before the National Aeronautics and Space Administration West Coast Dinner," 15.

budgetary challenge had the potential to derail the SSP and force its cancellation. That action was always attacked by reference to broader interests: "The aspirations and expectations shared by most Americans that American astronauts will be leaders in the future exploration of space will be placed on hold- indefinitely."[9]

Global Competitiveness

National power requires economic power and the SSP was promoted as a means of creating economic strength. Competitiveness for the global market is an important concept that appears throughout the SSP literature, especially in the post-1990 period. Competitiveness is inextricably linked to S&T and to the ability of a state to invest in the cutting edge of technology: "Thus, as other nations cast an eye toward commercializing the vast potential of space, U.S. companies must take care not to be left behind at the launch pad."[10] The 1992 *NASA Space Station Freedom: Strategic Plan* noted that, "If the U.S. did not maintain these skills, other nations most assuredly would, placing the U.S. in the precarious position of importing high-technology goods from them... [Space Station] Freedom will help to ensure that the U.S. retains a favorable competitive position in the years to come."[11] The *Strategic Plan* argues that,

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[9] James Fletcher, "Excerpts From Remarks Prepared For Delivery: NASA Press Briefing; Kennedy Space Center," (Washington: NASA Historical Collection, 1988), 2.
[10] David 1988.
[11] NASA, *Space Station Freedom: Strategic Plan 1992* (Washington: NASA, 1992), 40.

"Such information is vital if America is not to abdicate its role in human space flight."[12]

The development of new technology is seen as the key to this competitiveness. NASA, as a premier R&D agency, is described as an investment in US global competitiveness: "NASA alone cannot assure our competitiveness, but the agency's program can be- and I believe must be- an element in the nation's investment strategy."[13] OMB head Richard Darman told Congress in 1991 that, "the manned development of space... is going to force more rapid technological advance in materials processing, in energy storage and transmission, and a host of areas that are going to come back and do what we need to do domestically for the long term. That is, make break-throughs that will substantially increase productivity." Darman warned, "from an economic perspective, killing the Space Station is going to have an adverse effect on U.S. competitiveness."[14]

Embracing the technology spin-off argument, Ronald Reagan described the SSP as an investment in economic power: "can we afford to jettison the next generation of technical spinoffs? Just think about the thousands of discoveries, all the commercial and industrial products and techniques that came about because we developed the technology to go to the Moon. We hear a great deal about American competitiveness. Other nations often cite our

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[12] NASA, *Space Station Freedom: Strategic Plan 1992*, 35.
[13] Beggs, James. Space Station: The Next Logical Step. Washington: NASA, 1984a. p. 1)
[14] US Congress, House of Representatives, Committee on Science, Space, and Technology, *Impact of the Space Station Cancellation* (Washington: Government Printing Office, 1991), 40.

major scientific programs as among our greatest competitive advantages, and they're right... Can we afford to stop our exploration and wait for others to pass us?"[15]

Competitiveness is not simply a goal in itself but has an important political goal- American hegemony and dominance: James Sensenbrenner Jr., (R-WI), Chair of the House Science Committee, pointed to advances in space and other advanced technologies and cited them as "the building blocks of America's future dominance in the world."[16] Knowledge equals power in this formula and the SSP is presented as both a component of, and a source of, national power.

The claim that the space program produces a large number of high-tech jobs is also important from a foreign policy, as well as a domestic, standpoint.[17] The Space Station project has been described as necessary to "create jobs and economic opportunities" for "US leadership in space and in global competitiveness and to serve as a driving force for emerging technologies."[18] In this context, high-tech jobs become a national security issue because high value-added jobs, and the skills they require, strengthen the country. Daniel

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[15] Ronald Reagan, "Remarks at the Electronic Industries Association's Annual Government-Industry Dinner," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1988, Book I, January 1 to July 1, 1988* (Washington: US Government Printing Office, 1990), 481.
[16] James Sensenbrenner, "Keynote Address, 34th Goddard Memorial Symposium, American Astronomical Society," (Washington, DC: From the NASA Historical Collection, 1996).
[17] Approximately 750,000 people worked on the Apollo project (Robert Dallek, "Johnson, Project Apollo, and the Politics of the Space Program," In *Spaceflight and the Myth Presidential Leadership*, Roger Launius and Howard McCurdy, ed. (Urbana (Illinois): University of Illinois Press, 1997). NASA has also stressed the number of jobs the Shuttle program produced as a way to promote the project (Mark E. Byrnes, *Politics and Space: Image Making by NASA* (Westport (Connecticut): Praeger, 1994).

Goldin made such an argument when he pointed to the case of the supersonic transport project abandoned by the US but pursued by Europe. He claimed that decision led to the subsequent decline in aviation jobs in the US.[19] While a doubtful claim, it does indicate how specific projects can be given bigger relevance.

The Idea of Inevitability

The competition in space theme has an important sub-text that runs through much of the SSP discourse. Space activists and officials stress that the benefits of space are so enormous that it is *inevitable* that Humanity will reach out beyond the Earth. Within the space policy discourse, competition (however defined) is explained as being part of a broader historical imperative: space exploration (over a long-term time frame) is inevitable and some nation, perhaps even a US ally, will pursue space and gain the unique benefits that space offers. According to this reasoning, it is vital that the United States be part of space exploration. The idea of inevitability is used to reinforce the idea of international competition, as the rise of competition in space can be tied to the economic uses of space. Other states will reap the benefits of space, regardless of US policy and unrelated to any other factor: "[e]ven if the Challenger accident had not happened, the United States would have

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[18] NASA, *International Space Station Fact Book 1997* (Washington: NASA, 1997), 3.
[19] Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future, Remarks at the National Press Club," (Washington: NASA Historical Collection, 1994).

continued to face increasing competition in space through the 1990s and beyond."[20] The economic value of space development, both current and potential, are so great, that the expansion of economic, political, and military activities into space *shall* happen. It is not, however, inevitable that the United States will be the leader or even a beneficiary of this expansion. The role of the U.S. in space *is* a matter of choice and one that must be made, according to SSP promoters.

These assumptions are linked to the concept of Solar System exploration and colonization discussed in Chapter 6. Space exploration is seen as something larger than the individual or even the nation, but a broad historical (even evolutionary) process of economic and technological development. However, the expansion of civilization into space also has a national interest dimension. If Humanity is going to "conquer" space, it is vital that the United States head off possible rivals in this process. "The frontiers of space eventually will beckon us again to leave the confines of Earth and explore once more the lunar surface or land upon Mars... When this will occur is uncertain. *That it will occur is not at issue*, for the intangible imperative of human exploration will not, in the long run, be denied. It appears likely that men will journey back to the Moon or to Mars within the next forty years."[21] Exploration is presented as inevitable given time: "Sooner or later, people will walk the

[20] James Fletcher, "Excerpts From Remarks Prepared for Delivery: National Issues Forum On The U.S. Space Program: Directions For The Future," (Washington: NASA Historical Collection, 1986).

deserts of the Moon again- next time to establish an outpost and new enterprises. Sooner or later, people will explore the plains and canyons of Mars and plant colonies on that most fascinating and relatively hospitable planet. It is no longer a question of whether people will make these journeys. *The questions now assume the inevitable*. Which nation or nations will accept these challenges? And when?"[22] If the US does not assume the task of space exploration, other countries inevitably will. Decisions made now will effect generations of future Americans and either expand or constrain their future opportunities: "I feel the currents of history are rapidly taking us toward a decisive fork, an irreversible set of choices that will determine for our lifetimes the role and position to which the US can aspire in carrying forward man's destiny beyond the frontiers of Earth."[23]

"The Flagship:" American Leadership in Space

This choice, and the importance of space, leads to the next dimension of competition, the need for American leadership to ensure that "the future in space can belong to us in this country, if we wish it to be."[24] In US space policy, leadership has traditionally been defined in "largely political and military

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[21] Andrew Stofan, "Space Station: A Step into the Future," (Washington: NASA, 1988). Emphasis added.

[22] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Weldon Taylor Lecture, Westminster College of Salt Lake City," (Washington: NASA Historical Collection, 1988). Emphasis added.

[23] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Explorers Club, New York City," (Washington: NASA Historical Collection, 1989), 9.

terms."[25] In the 1960s American leadership was defined as preventing a hostile state (i.e. the Soviet Union) from controlling space. After American successes, the emphasis shifted to *maintaining* American leadership and demonstrating it through ambitious and challenging activities.[26] Demonstrating American capabilities is still a reason to go into space. Ronald Reagan's remarks on the first landing of Space Shuttle *Columbia* in 1981 linked U.S. technological accomplishments with its political system: "Today the world watched us in triumph. Today our friends and adversaries are reminded that we are a *free people capable of great deeds.*"[27]

Throughout the SSP literature are references to American "leadership," in space and on Earth. The Space Station is described as a "tangible symbol of U.S. leadership"[28] and as the means to ensure American "leadership in space science and exploration."[29] Leadership in space is described in terms of urgency and criticality: "The stakes are enormous. The issue is leadership. We must continue to lead in space science and its applications, in space technology, in space-based commercial operations, and in manned space

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[24] The quote is by James Odom, then Associate Administrator for Space Station, cited in NASA, *Space Station: A Research Laboratory in Space* (Washington: NASA 1988), 11.
[25] Kenneth S. Pedersen, "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," *Space Policy* (August 1992), 205-20.
[26] Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).
[27] Ronald Reagan, "Statement on the Landing of the Space Shuttle *Columbia* Following Its Inaugural Flight," *Public Papers of the Presidents of the United States: Ronald Reagan, 1981. January 20- December 31, 1981.* Washington: U.S. Government Printing Office, 1982, 353. Emphasis original.
[28] NASA, *Space Station Freedom: Strategic Plan 1992*, i.
[29] NASA, *Space Station Freedom: Gateway to the Future* (Washington: NASA, 1992), No Pg;

flight. The Space Station Program will ensure that we do that."[30] Statements employing the theme of American leadership allude to the intangible psychological benefits of space and well as the practical goal of demonstrating American technological prowess in the exploration of space. By carrying out an ambitious project like the SSP, NASA is providing "a demonstration of America's role as a world leader in space"[31] NASA officials from the Space Station Program described it as "a highly visible demonstration of U.S. leadership."[32] It is this demonstration of power, and securing opportunities that are at the core of the leadership theme.

John Hodge, in a written follow-up to 1983 Congressional testimony, argued, "a space station would assure, for the US, civil leadership in space during the 1990's."[33] The head of NASA's Space Station Office in the late 1980s, James Odom, was quoted in a NASA publication saying, "Let us keep in focus the concept that underlies the Space Station endeavor, providing a sense of urgency and direction. The concept is leadership. The Space Station is all about leadership in space."[34] Eight years later then Vice President George

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Philip E. Culbertson and Robert F. Freitag, *The Partnership: Space Shuttle, Space Science, and Space Station* (Washington: NASA, 1986), 1.

[30] John Hodge cited in Culbertson and Freitag 1986, 13.

[31] Daniel Goldin, "Dayton Air Show, Dayton Ohio," (Washington: NASA Historical Collection, 1992).

[32] Culbertson and Freitag 1986.

[33] US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983), 85.

[34] NASA, *Space Station: A Research Laboratory in Space*.

Bush echoed this sentiment and gave it a further ideological twist: "We will leave the solar system...because it is democracy's destiny."[35]

Competition in space demands American leadership, both as an autonomous actor and as the leader of its allies and the world. The 1998 *ISS Fact Book* stressed the international and leadership elements of the SSP: [It is] "U.S.-led, [and the] single largest international aerospace project ever undertaken by humankind [that] [f]osters peaceful relations peaceful relations among the 16 participating countries by building trust and sharing mutual goals for the benefit of all peoples." The SSP represents cooperation but also American leadership.

Daniel Goldin in 1993 also linked leadership to broader values: "Will the station give us leadership in space? Yes, I believe it will, but it is the kind of leadership that grows from trust among friends and partners on a frontier. It is the kind of leadership that comes from keeping our promises. It is the kind of leadership that we would absolutely abdicate if we cancel the station. And leadership abandoned is leadership lost."[36] Human space flight itself is a vital component of US leadership: "It assures a leadership role for the U.S.- a position that cannot be preserved unless the human space flight program, beginning with Freedom, is pursued with vigor and determination."[37]

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[35] George Bush, "Remarks at theTexas A&I University Commencement Ceremony in Kingsville," *Public Papers of the Presidents of the United States: George Bush. 1990, Book I, January 1 to June 30, 1990* (Washington: U.S. Government Printing Office, 1991), 645.
[36] Daniel Goldin, "To Boldly Go: Giving Thought to What Comes Next in Space," (Washington: NASA Historical Collection, 1993), No Pg.
[37] NASA, *Space Station Freedom: Strategic Plan 1992*, 39.

According to this argument, the Station will provide great benefits for the whole world, especially the US. As the United States is the central and leading state in the SSP, the project will enhance the US position as the dominant space power: "...the Space Station was- and is- envisioned to be the flagship of future NASA programs, assuring for the United States preeminence in the utilization and exploration of space."[38] Space dominance is linked to global dominance: "in the coming century, first in space will mean first on Earth. And America intends to stay number one."[39] The theme of leadership therefore is central to the SSP literature and recurs throughout the literature examined.

Leadership is important because of the practical (i.e. economic and military) value of space assets as well as the spin-offs that would occur. Its importance lies in economic, technological, and political returns: "[The SSP] [a]llows for international cooperation while also promoting America's technological leadership and international economic competitiveness."[40] Terence Finn wrote in 1993, "Does leadership matter? One might argue that leadership in space is no longer relevant. However, given the linkage of space activities to science and technology, to commerce and national esteem, the answer is that it matters a great deal. The world is a competitive place, where standards of living and national security cannot be taken for granted. Activities

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[38] Stofan 1988.
[39] George Bush, "Remarks to Students and Faculty of the University of Tennessee at Knoxville," In *Public Papers of the Presidents of the United States: George Bush 1990. Book I, January 1 to June 30, 1989* (Washington: U.S. Government Printing Office, 1991), 152.
[40] NASA, *International Space Station Fact Book 1998* (Washington: NASA, 1998).

in space have a genuine role to play in this regard"[41] James Fletcher made the same argument in 1988 when he said: "it is essential for all Americans to recognize that technical and scientific leadership in space and economic leadership on earth can never be taken for granted. Leadership is not ours by right."[42]

Leadership also has important symbolic political value. US leadership is described as a part of the national heritage or character. A legacy of past space accomplishments demands equally impressive follow-ups. "Our heritage of leadership speaks for itself. Apollo and Skylab, Voyager and Viking were challenges to our technological skills. Rich in scientific returns, they demonstrated American preeminence in space. Today, the Space Shuttle reflects that leadership. The space station will be a worthy successor to these programs, and will further demonstrate America's intent to continue to lead the way."[43]

Maintenance of American leadership and recovery of past leadership are both important formulations. Philip Culbertson wrote in 1982, "A U.S. space station in permanent orbit would maintain well into the 1990's our position of

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[41] "Draft Space Station FY94 Themes. Document in Support of J. Dailey's Memo of 12 May 1993," (Washington: NASA Historical Collection, 1993).
[42] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Channel City Club; Santa Barbara, California," (Washington: NASA Historical Collection, 1988), 8; Fletcher made similar comments in, James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Press Club," (Washington: NASA Historical Collection, 1988), 7.
[43] Beggs, 1984, 1. The same document concludes "What is at stake is leadership in space during the decade of the 1990s and beyond" (5).

leadership among spacefaring nations... this position can no longer be taken for granted."[44] John Hodge wrote in 1985:

> A space station must be built if we are to maintain the position of leadership so convincingly demonstrated-- in the past by Apollo, and now, most recently, by the flights Columbia, Challenger and Discovery. This position no longer goes unchallenged. Space is now competitive... The Space Shuttle still gives us the edge. No one has anything quite like it. But alone, the Shuttle will not enable the United States to realize the full potential of space. Only a space station, permanently orbiting the earth, can do that.[45]

A NASA 1986 Fact Sheet declared, "The President's Space Station directive underscores a national commitment to maintaining United States leadership in space. Such leadership is essential, for America has become dependent upon operations in space... Continued U.S. leadership in space is but one reason why a Space Station should be built."[46] A publication written by Andrew Stofan said that "...the Space Station was- and is- envisioned to be the flagship of future NASA programs, assuring for the United States preeminence in the utilization and exploration of space."[47] The process of space exploration has a logical course best represented by the SSP: "I believe that such leadership in the years ahead must belong to the United States and that the Space Station Program upon which we've embarked is the best way to secure

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[44] Philip Culbertson, "Current NASA Space Station Planning," *Astronautics and Aeronautics* (September 1982), 37-59.
[45] John Hodge, *A Space Station For America* (Washington: NASA, 1985).
[46] NASA, John F. Kennedy Space Center, *NASA Facts: Space Station* (Washington: NASA Historical Collection, 1986), No Pg.
[47] Stofan, *Space Station: A Step into the Future*.

it. The Space Station was- and still is- the next logical step for our nation in the exploration and utilization of space."[48]

After the *Challenger* accident, *recovery* of the US position in space was a central theme: "The Space Station is essential to regaining a position of leadership in space for the United States."[49] The *Challenger* accident posed the greatest threat to the American space program, and the SSP was offered as a means to accelerate recovery: "The Space Station is an essential element of NASA's on-going program to recover from the loss of the Challenger and to regain for the United States its position of leadership in space. Such leadership was won through imagination, daring and hard work. It will take substantial qualities of all three for out country to again lead the way in the exploration and utilization of the space frontier."[50] Recovery was possible, given the right approach: "We have the right program at the right time to begin to restore United States' leadership in space at a time when we need it most- a time when the competition is strong and growing stronger."[51]

An element of the competition argument is the warning that failure to act is, in effect, a surrender of the national heritage.[52] This was major recurring theme in many of James Fletcher's public statements when he was Administrator in 1986-89. In 1987 he wrote: "Without the space station, the

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[48] Stofan, *Space Station: The Next Logical Step*, 1.
[49] NASA, *Space Station: A Research Laboratory in Space*, 1.
[50] Stofan, *Space Station: A Step into the Future*.
[51] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Weldon Taylor Lecture, Westminster College of Salt Lake City," (Washington: NASA Historical Collection, 1988).

United States would, in effect, abdicate to its adversaries and allies alike its role as a world leader in space."[53] During the post-*Challenger* period, the emerging space capabilities of Europe and Japan, in addition to those of the USSR, were presented as warnings against cutting the NASA budget: "Deep cuts in the NASA budget this year [1988] would set us back even further, and would be tantamount to another Challenger accident in their effects. Such cuts would transform our long-term leadership goal into an idle dream..."[54] A year later Fletcher said, "I do not believe, when clearly faced with the implications of a collapsing civil space effort, that America will want to cede our hard won position of preeminence."[55] Delay or cancellation of the SSP poses a danger of abdicating American leadership, which is described in almost shameful terms. The surrender of leadership would shameful because the SSP is symbol to the rest of the world of America's "intention to maintain leadership in space technology and space operations."[56]

In 1988 Fletcher wrote to Congressman Patrick Leahy, "It is a tangible demonstration of this Nation's commitment to space leadership...Without the Space Station the United States would be foregoing vast future opportunities

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[52] James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Space Outlook Conference, Vienna Virginia," (Washington: NASA Historical Collection, 1988), 3.
[53] NASA, "Statement by Dr. James Fletcher in Response to Sen. Proxmire's Statement Asking For Abolishment of the Space Station," (Washington: NASA Historical Collection, 1987).
[54] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Engineering Deans' Council Engineering Deans' Institute, San Juan, Puerto Rico," (Washington: NASA Historical Collection, 1988), 8.
[55] James Fletcher, "Excerpts From Remarks Prepared For Delivery: U.S. Space Foundation's Fifth National Space Symposium, Colorado Springs, Colorado," (Washington: NASA Historical Collection, 1989).

for scientific, political, and economic gain. Most importantly, the United States would be abdicating its role as world leader in space activities."[57] A speech the same year Fletcher commented that without the SSP "we'll be turning the clock back, just as others are moving ahead. The Soviet Union, Japan, Europe, and China and others have demonstrated strong commitments to their respective space programs, and continue to progress. Indeed, the Soviets are now operating a space station, which gives them at least a ten-year lead over us in the occupation of space... It's ironic that this year, the year NASA prepares to celebrate its 30th birthday, could be the beginning of the end of our major civil space activities."[58] The alternatives to fully funding NASA, Fletcher warned was either to defer the SSP and fall further behind the Soviets in space station operations or to largely abandon human space flight and "accept permanent second place to the Soviets."[59]

Fletcher tied the SSP to America's status in space and in the world: "The United States will fall even further behind the Soviets and eventually, will trail the Europeans, Japanese and the Chinese, all of whom will not wait for us. The prospect of the United States... becoming a second-rate, or even third-rate national in space, is very real. That's not a pretty picture. It's not the way

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[56] Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983).
[57] James Fletcher, "Letter From James Fletcher to Patrick Leahy," (Washington: NASA Historical Collection, 1988).
[58] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Channel City Club; Santa Barbara, California," (Washington: NASA Historical Collection, 1988).
[59] Fletcher 1988, 4. Fletcher was citing two alternatives identified in a Congressional Budget office report.

Americans want their country to be; nor is it the way they want the rest of the world to perceive it."[60] These words were echoed by Fletcher's successor Richard Truly: "Those who would have us become a second or third rate power in space would low down or cancel Space Station Freedom... To those who ask whether this country can afford to move forward in space, I say: can we afford not to?"[61]

An unspoken assumption of these arguments is that leadership in space, as in other things, is not a given but a choice, dependent on national resolve: "America's future in space can be bright indeed- if we once again accept the challenge of leadership."[62] Such arguments stress the need to act, the importance of political leadership, and political support in the US government.[63] The SSP is "[p]ermanent for efficiency, but, perhaps more importantly, as a clear indication of our national resolve to maintain the position of leadership in space established by the United States during the past 25 years."[64] Without the SSP, the entire US space program would "fall into disarray, and with it, the

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[60] James Fletcher, "Excerpts From Remarks Prepared For Delivery: NASA Press Briefing; Kennedy Space Center," (Washington: NASA Historical Collection, 1988).
[61] Richard Truly, "Excerpts From Remarks Prepared For Delivery: National Space Outlook Conference, Tyson's Corner, VA," (Washington: NASA Historical Collection, 1989).
[62] James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Space Symposium, United States Space Foundation, Colorado Springs, CO," (Washington: NASA Historical Collection, 1988).
[63] James Fletcher, James. "Excerpts From Remarks Prepared For Delivery: Engineering Deans' Council Engineering Deans' Institute, San Juan, Puerto Rico," (Washington: NASA Historical Collection, 1988).
James Fletcher, "Excerpts From Remarks Prepared For Delivery: Weldon Taylor Lecture, Westminster College of Salt Lake City," (Washington: NASA Historical Collection, 1988).
Richard Truly, "Remarks Delivered at the National Space Club Luncheon, Washington DC," (Washington: NASA Historical Collection, 1992).
[64] James Beggs, "Letter From James Beggs to Edwin Meese," (Washington: NASA Historical Collection, 1982).

prestige and leadership we worked so hard to gain."[65] With Apollo a fading memory and *Challenger* a recent humiliation, restoring American leadership was an emotional as well as practical goal.

"A Symbol Of Our National Competence:" National Prestige and Greatness

The SSP is promoted as a source of American prestige in other countries. The 1980 NASA Transition Team Report defined prestige as "how others view us, the global perception of this country's intellectual, scientific, technological, and organizational capabilities."[66] This argument, related to the national pride argument discussed in Chapter 6, associates space activities to the US international image. In this literature, pride and prestige are logically linked, one being directed internally, the other externally. They are often placed together in a single sentence: "a space station would serve to enhance national pride at home and national prestige abroad;"[67] "Freedom will go far to ensure our competitive edge in space, and contribute to American pride and prestige."[68] Enhancement of national pride is tied to the activities of the past and those of the future. Prestige is part of the competitive world of international

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[65] James Fletcher, "Excerpts From Remarks Prepared For Delivery: ARCS Foundation/Smithsonian Symposium on Science Education and Science Policy," (Washington: NASA Historical Collection, 1989).

[66] George Low, "George M. Low, Team Leader, NASA Transition Team, to Mr. Richard Fairbanks, Director, Transition Resources and Development Group, December 19, 1980, With Attached: 'Report of the Transition Team, National Aeronautics and Space Administration'" (NASA History Office [Web Page], 1980), http://www.hq.nasa.gov/office/pao/History/low80.html, 4.

[67] James Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society," (Washington: NASA Historical Collection, 1982).

[68] David 1988, 4.

rivalry: "Because we have built on our achievements, we have a strong space program, one that our rivals should envy."[69]

As van Dyke (1964) noted, space programs have psychological power in international politics.[70] Promotion of national prestige has been a common theme from the flight of Alan Shepard in 1961 to the Space Shuttle.[71] The Soviet Union obtained enormous prestige through its activities. Space spectaculars lent credence to Soviet claims of technological and social superiority.[72] Drawing on this tradition, the SSP is described in terms of national power and capability: "A Space Station is both a powerful symbol and a powerful tool."[73]

The US space program has always been a very public operation, a fact that has caused frequent embarrassment to NASA officials when things have gone awry. However, that same visibility made the space program a symbol of national accomplishment, a concept embraced by NASA: "As a program of high visibility, it is a symbol of national achievement. As a font of high technology advances and greater innovation and productivity, it has made and continues to make unique contributions to the nation's economy, competitiveness, pride and

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[69] Fletcher, "Excerpts From Remarks Prepared For Delivery: National Space Symposium, United States Space Foundation, Colorado Springs, CO."
[70] van Dyke 1964.
[71] NASA, *The Best We Can Be* (Washington: NASA, 1989).
[72] Hans Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College," (Washington: NASA Historical Collection, 1984).
[73] Stofan, *Space Station: The Next Logical Step*, 1.

global prestige."[74] The idea of national greatness reflects internal and external perceptions. Hans Mark noted in a 1983 speech that, "achievements in space operations are, for better or worse, a measure of national prestige- and more important- a measure of *national competence* by many people around the world."[75]

The respect of the world returns in the form of national pride, as James Fletcher noted:

> In fact, America's space program, more than any other enterprise, symbolizes what's best about America- our unique blend of vision and pragmatism, our openness, our boldness, our optimism and our creative, pioneering spirit... [T]he space program reflects America's standing in the world, in science, in technology and in their applications for the benefit of mankind. Where we stand in space is a pretty good barometer of how the rest of the world perceives us; and to a large degree, how we perceive ourselves.[76]

National greatness is not only a symbolic-emotional phenomenon but also a policy tool. Prestige has utility for enhancing US alliance ties. "Imaginative initiatives of this kind have often had enormous political impact that have value much beyond the funds that are expended on them."[77] Hans

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[74] James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Space Club," (Washington: NASA Historical Collection, 1988).

[75] Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983). A similar formulation is in, Hans Mark, Hans, "The Space Station-- Mankind's Permanent Presence in Space: The Aerospace Medical Association Louis H. Bauer Lecture," (Washington: NASA Historical Collection, 1984): "A Space Station is a symbol of our national competence in high technology and in the exploration of the unknown."

[76] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Los Angeles World Affairs Council," (Washington: NASA Historical Collection, 1987). In October 1988, Fletcher gave another speech with a similar argument: "the space program is and always will be a visible measure by which the rest of the world judges us and, indeed, by which we judge ourselves." (James Fletcher, "Excerpts From Remarks Prepared For Delivery: Metal Trades Department, AFL-CIO; 63rd Annual Convention," (Washington: NASA Historical Collection, 1988)).

[77] Mark, "The New Enterprise in Space: Commencement Exercises, Trident Technical College."

Mark told Congress in 1984, "I think the idea that we create this space station as an international effort is something that will not only bear technical results, but it will also be important for our foreign relations and for our foreign policies."[78]

The space program is said to produce national prestige because it shows the US as a "great nation," that grows by striving and achieving.[79] The US is great because it "cast[s] light into those shadows" of the unknown.[80] A NASA promotional poster from 1992 promoted the Space Station simply: "Great nations dare to explore."[81] The US space program is viewed as a monument to civilization and its greatest triumph, the Moon landings, an accomplishment akin to the pyramids.[82] Failure in this field would be tragic in many ways, as James Fletcher noted in 1988: "It would be unthinkable to turn back now- to slow down or stop our enterprise in space. In this increasingly competitive world, great nations can't afford to mark time. If they are to move ahead, they

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[78] US Congress, Senate, Committee on Commerce, Science and Transportation, Subcommittee on Science, Technology, and Space, *NASA Authorization for Fiscal Year 1985* (Washington: Government Printing Office, 1984), 13.
[79] Daniel Goldin, "Remarks by NASA Administrator Daniel S. Goldin, Oshkosh, Wisconsin," (Washington: NASA Historical Collection, 1992), 1, 3.
[80] James Beggs, "Technology, Imagination, and Faith," In *Space Station: An Idea Whose Time Has Come*, Theodore Simpson, ed. (New York: Institute of Electrical and Electronics Engineers, Inc., 1984), 94.
[81] NASA, *Space Station Freedom.* (Washington: NASA, 1992).
[82] Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future," In *Remarks at the National Press Club* (Washington: NASA Historical Collection, 1994). Goldin's reference to the pyramids echoes a statement made by writer James Michener in testimony before Congress on 28 April 1992. Goldin circulated copies of the testimony to NASA staff a few days later praising Michener's support Daniel Goldin, "Memo to the NASA Team," (Washington: NASA Historical Collection, 1992). In 1996, James Sensenbrenner, Jr. made a similar allusion in a speech to the American Astronomical Society (James Sensenbrenner, "Keynote Address, 34th Goddard Memorial Symposium, American Astronomical Society" (Washington: NASA Historical Collection, 1996).

must set new goals and undertake new challenges;"[83] and again in 1989: "If cut significantly, space station Freedom will be canceled, and we will deliver a clear message to our children and the rest of the world- the United States intends to leave the business of space exploration to others. I do not want that to happen. I do not want to see that door to the future slammed so incontrovertibly shut.[84]

Space has always been an arena of nationalistic displays and politically driven projects; failures have resulted in national anguish. Retrenchment of a program or cancellation of a specific project is viewed not merely as restructuring but a loss of confidence and vitality by the nation itself. National prestige in the world at large has not been an abstract concept but is closely tied to international relations. The projection of a positive image abroad is an unofficial task of NASA: "The space station in addition contributes to the picture of the United States we project abroad. As a civil agency, NASA programs reflect our peaceful intent in space. They are, nonetheless, a vivid demonstration of America's power."[85]

Although prestige was important during the Cold War, in the post-Cold War period, national prestige was presented as a resource for the uncertain international environment: "[Space Station] Freedom will serve as a cohesive and visible national goal, providing a source of pride and inspiration as the nation reorients its leadership position in a world no longer divided by a Cold

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[83] James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Press Club," (Washington: NASA Historical Collection, 1988), 10.
[84] Fletcher, "Excerpts From Remarks Prepared For Delivery: U.S. Space Foundation's Fifth National Space Symposium, Colorado Springs, Colorado."

War."[86] Having "won" the Cold War, it was still America's duty to lead the world. Richard Darman told Congress in 1992:

> America is the world's number one politico-economic power, an inspiring beacon of hope, a continually self-renewing pioneer of new frontiers. America did not rise to this remarkable position on the strength of votes for the status quo. America will not preserve its position or fulfill its historic responsibility with short sighted votes of retreat... Space Station Freedom is a direct outgrowth of the spirit of the Kennedy inaugural, the America spirit. I believe that spirit to be irrepressible, so I'm confident that in due course the Congress will live up to America's tradition, responsibility, dreams, and mission and will set us firmly on the path towards manned exploration of the next frontier. For the moment, however, we're obligated to address a misguided detour sign that would steer us away from America's historic pioneering path.[87]

National greatness, like leadership, is a choice that requires direct action to achieve. Ronald Reagan rhetorically asked: "Some say we can't afford the space station. I ask you: Can America ever afford to stop dreaming great dreams?"[88] George Bush also characterized national greatness as a matter of deliberate action: "Don't postpone greatness. History tells us what happens to nations that forget how to dream."[89]

The Competitive Context: Discussion

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[85] Beggs, *Space Station: The Next Logical Step.* 1.
[86] NASA, *Space Station Freedom: Strategic Plan 1992*, 3.
[87] US Congress, *Impact of the Space Station Cancellation*, 15.
[88] Ronald Reagan, "Remarks at the Electronic Industries Association's Annual Government-Industry Dinner," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1988, Book I, January 1 to July 1, 1988* (Washington: US Government Printing Office, 1990), 481.
[89] George Bush, "Remarks to Employees of the George C. Marshall Space Flight Center in Huntsville, Alabama," In *Public Papers of the Presidents of the United States: George Bush 1989. Book I, January 20 to June 30, 1990* (Washington: U.S. Government Printing Office, 1990).

A consistent theme in the SSP literature is the association of the project with American power. Ronald Reagan's speeches regarding space stressed American greatness as a primary goal of the program and the SSP was merely one additional project to demonstrate American greatness in space. George Bush used a similar argument during his Administration, claiming that the Space Station would stimulate the "growth, prosperity, and technological superiority of the Nation."[90]

Competition from American allies was a critical part of this competitive discourse. According to Richard Truly, this concern was more common in Congress than within NASA, where international competition was less of a worry.[91] However, competition is vital ingredient when making a case for leadership. A leader without followers (or pursuers) is racing alone, an emotionally unsatisfactory pastime. With real rivals in space, American leadership can be presented as threatened and important for national welfare or survival. The existence of rivals is also a reassurance that space exploration is valuable, for a prize has greater value if others also seek to possess it.

Competitiveness in space is defined as translating into competitiveness on Earth. Richard Truly made such a claim in 1991, warning "[t]he development and assembly of Space Station is our commitment to furthering America's leadership. To turn our back on funding Freedom would eliminate an American

[90] George Bush, "Remarks on the 20th Anniversary of the *Apollo 11* Moon Landing, July 20 1989," In *Public Papers of the Presidents of the United States: George Bush 1989. Book II, July 1 to December 31, 1989* (Washington: U.S. Government Printing Office, 1990).
[91] Richard Truly, Interview With Author, 4 September 1998.

permanent presence in space, and it would put our entire Space Program in great jeopardy. It would put at risk our role as a leader in science and high technology, our ability to compete in the world marketplaces of today and tomorrow, and our ability to make and fulfill international commitments."[92] The Space Station *Strategic Plan* associates space, commerce, and national power: "Freedom is a visible demonstration of America's technological prowess- an advertisement for U.S. goods and services"[93]

A "Global Village": The Space Station and International Cooperation

A Symbol of International Unity

Running through the SSP discourse are claims that space activities by the United States benefit all of Humanity. Alongside images of competition and nationalism has been the idea of cooperation. Despite competition, space has been an arena of international cooperation and even a sense of international unity.[94] Cooperation in space facilitates additional cooperation, essential for the more ambitious space projects advocates hope for.[95] In addition, claims that a

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[92] US Congress, *Impact of the Space Station Cancellation*, 45.
[93] NASA, *Space Station Freedom: Strategic Plan 1992*, 40.
[94] This dual nature of the space environment is not inherently contradictory; other domains of international behavior reflect concurrent cooperation and competition. Arms control through out the Cold War, for example, required some cooperation but was premised on continued competition in the production of weapons.
[95] Richard Truly, "Excerpts From Remarks Prepared For Delivery: Pathway to the Planets Conference, Washington DC," (Washington: NASA Historical Collection, 1989).

project intends to benefit all Humankind are more legitimate if several rather than one state is involved.

The Space Station was "international" from the very beginning and partnerships forged with other states were frequently cited by SSP advocates. The SSP was "an unprecedented international cooperative science and technology venture."[96] "[T]he rewards will be great, for the Space Station will significantly enhance our mutual capabilities to operate in space."[97] References to cooperation extended to the specific partners and to generic international cooperation.

The reality of citizens of different nations working together is cited as increasing international understanding. The SSP is a "Global village" where astronauts from different nations would work together.[98] The Space Station *Strategic Plan* noted: "This effort demonstrates how nations can work together for scientific and technological progress. In space exploration, the enormous costs are best shared by those who share our goals and have a common vision of the future."[99] Dan Goldin suggested in 1995 that the SSP was an evolving political project, capable of incorporating additional partners:

> We need to build it, operate it, and use it. We need to make the international partnership work. Furthermore, let's leave the door open for expanded international participation. Use of the Station by many nations is possible, and added participation of space-faring

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[96] NASA, *Space Station Freedom: Strategic Plan 1992*,5.
[97] Philip Culbertson, *Space Station: A Cooperative Endeavor* (Washington: NASA Historical Collection, 1985).
[98] NASA, *Space Station Freedom: Gateway to the Future.*
[99] NASA, *Space Station Freedom: Strategic Plan 1992*, 3.

> nations could easily be accomplished. For example, other countries could add on modules in the years to come.[100]

Goldin claimed the complexities of the SSP would provide experience in management and coordination that had value in itself: "How do you do this on a global basis? I know of no better training ground than Space Station; it's the largest international peacetime, technological project for learning how to work in space... Space Station is a shining light; I know of no other project that can do [sic] bring nations together like that."[101]

There is also a more abstract understanding of cooperation, connecting the project to "the promise of man," as George Bush put it in 1989.[102] The reach into space reinforces the sense that Humanity is a single species sharing a small planet. Cooperation unites diverse peoples and individuals; space flights are described as "shared experiences" that produces "a profound sense of brotherhood" for crew and Earth-bound observers alike.[103] In relation to the SSP, NASA writers and speakers describe the Space Station as a "symbol of international cooperation" and peaceful collaboration.[104] The SSP "will be an example of how nations can unite and work together on projects of peace."[105] James Beggs said in 1982, "For now, as we begin to plan towards our next

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[100] Daniel Goldin, "The Challenge of Space Exploration in a New Era," *Space Times* (January-February 1995), 7-9.
[101] Daniel Goldin, "Remarks to the Space Station Transition Team at the National Air and Space Museum," (Washington: NASA Historical Collection, 1993), No Pg.
[102] George Bush, "Remarks on Greeting the Crew of the Space Shuttle Discovery," In *Public Papers of the Presidents of the United States: George Bush 1989. Book I, January 20 to June 30, 1989* (Washington: U.S. Government Printing Office, 1990), 311.
[103] Richard Truly, *Space Shuttle: The Journey Continue* (Washington: NASA, 1988).
[104] Culbertson, "Space Station: A Cooperative Endeavor," 9.

great goal in space, I believe we cannot afford to foreclose international involvement. For the long term, the human race has too much to gain by such cooperation."[106] The Space Station would serve as a "visible symbol of international cooperation."[107] James Fletcher said in 1988: "[The Space Station] is a symbol of our desire and our ability to work together with our friends and allies on a civil program for peaceful purposes."[108]

Because of the symbolic benefits to accrue from the SSP, international cooperation is an imperative:

> We must build a solid framework for space ventures that transcends rivalries between nations or groups of nations. And we must begin to build that framework now, here on earth, so that the best minds, wherever they may be found, will work together, not for years or decades, but for centuries, to use space in the most productive, economical and rational ways we can... Even most critics of international cooperation in space agree that by sharing scientific expertise and data from our joint missions we have not only expanded the knowledge base, but also have shared the cause of international understanding and, ultimately, of peace.[109]

Practical Benefits of Cooperation

While international partnerships have symbolic elements, they also have practical "real world" benefits. Cooperation in the SSP would "further the overall

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[105] Daniel Goldin, "Remarks by NASA Administrator Daniel Goldin, American Society of Mechanical Engineers," (Washington: NASA Historical Collection, 1992), 2.
[106] James Beggs, "Suggested Remarks, Space Science Board Meeting," (Washington: NASA Historical Collection, 1982), 9.
[107] Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England."
[108] Fletcher, "Letter From James Fletcher to Patrick Leahy."
[109] Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England."

space goals of the U.S."[110] One benefit that is mentioned directly in NASA publications is cost sharing, although rising cost estimates make this claim impossible to evaluate. The claim is made that the partners would make the project more cost effective. They could produce Station components in exchange for access to the facility. Cooperation would enhance the capability of the SSP, reduce the cost share for each state, and increase the total funds available, allowing for "a more expansive effort."[111]

Cooperation also had practical political importance. Practical international cooperation, such as the exchange of information and joint projects, occurred between the US and the Soviet Union even at the height of the Cold War.[112] Even the Soviet Union was not entirely excluded from this cooperative vision, especially when discussants addressed missions to Mars.[113] For the SSP, international partners were potential lobbyists on the project's behalf.[114] James Beggs noted in 1982, as the NASA lobbying effort for the SSP was still building, "the involvement of foreign nations could add a degree of stability to the program, which... I firmly believe could help to sustain its political support and funding during the crucial development phase."[115] International

[110] NASA, *Space Station Freedom: Strategic Plan 1992*, 34.
[111] James Beggs, "Suggested Remarks, Space Science Board Meeting," (Washington: NASA Historical Collection, 1982).
Andrew Stofan, *A Research Laboratory in Space* (Washington: NASA, 1987), 3.
[112] For more on cooperation during the Cold War see, Arnold Frutkin, *International Cooperation in Space* (Englewood Cliffs (New Jersey): Prentice-Hall, 1965) and van Dyke 1964.
[113] See Beggs, "The Wilbur and Orville Wright Memorial Lecture. Royal Aeronautical Society, London, England."
[114] Marcia Smith, Interview With Author, 10 June 1998. Marcia Smith is a Specialist in Aerospace and Telecommunications Policy at the Congressional Research Service.
[115] Beggs, "Suggested Remarks, Space Science Board Meeting."

partnerships were a means by which the US could access foreign talent and technology.[116] The US would also obtain a limited amount of influence over other countries activities. Cooperating agencies would contribute to the overall capabilities of the Space Station.[117] Therefore, the international partnerships were realistic propositions: Kenneth Pederson told Congress in 1983, "We would tend to approach [the SSP] and we should assume the other countries are approaching it, in terms of basic self-interest."[118]

International participation in the SSP is described as "a 'genuine partnership.' It involves friends with common interests. NASA is committed to making this partnership a successful one."[119] Cooperation is not confined to platitudes or symbolic language but includes practical benefits. This exchange in between Congressman George Brown and NASA external affairs chief Kenneth Pedersen (both SSP supporters) illustrates how both idealism and realism can be embraced by SSP advocates:

> Mr. BROWN. This discussion of mutual benefits verses- well leads me to comment that I know of no situation that builds good will better than one which provides *mutual benefit*...
> Mr. PEDERSEN. Mr. Brown, I would not want the record to show that the witness came out in against international good will. My comment was related to the fact that I think that good will has to have a substantive basis. And I couldn't agree with you more, good will tends to be basically engendered by self-interest, finding its root in *mutual benefit*.[120]

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[116] John Hodge, Interview With Author, 4 June 1998.
[117] Stofan, *Space Station: The Next Logical Step*, 5.
[118] US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983).
[119] Andrew Stofan, *A Research Laboratory in Space* (Washington: NASA, 1987), 3. The same sentence appears in, NASA, *Space Station: A Research Laboratory in Space.*
[120] US Congress, *NASA's Space Station Activities* 126. Emphasis added.

These activities have been of "mutual benefit" to both the United States and the nations involved. The interest of other countries in the SSP was "self-generated."[121] This was due to the advantages of working with "a country like the United States with its large space program and its history of international cooperation."[122] The interest of the allies supports the claim that the SSP has value. The "autonomous" interest of the international partners is provided as evidence of common aspirations and dreams. This type of argument was used by James Beggs in 1985:

> But no matter how perceptions may differ, in the end we have found that, as free people, we *can* share the same dream. And that dream is brighter future for humanity, as we work together to open space for peaceful purposes and for the benefit of all... Indeed, such missions as the development of a manned lunar base or a manned mission to Mars could well be follow (sic) the Space Station. Missions of this kind could have universal appeal and would inevitably bring the world's peoples closer together. Thus they would enhance the prospects for peace on earth and in space.[123]

Keeping America's Word: National Credibility

Cooperation requires credibility and the confidence of others. National credibility and the need to keep US commitments to its partners has been an important theme in the SSP literature. The Space Station *Strategic Plan* states that:

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[121] US Congress, *NASA's Space Station Activities,* 93.
[122] US Congress, *NASA's Space Station Activities,* 93
[123] Beggs, "Remarks Prepared For Delivery to Keidanren..."

> Since the Freedom program is a highly visible example of U.S. international cooperation, the U.S. would suffer a significant loss of credibility if the program failed to meet these commitments. Future international participation in endeavors such as the Space Exploration Initiative would be seriously jeopardized if agreements and obligations on the Freedom program are not met.[124]

This type of argument is defensive: ending the SSP will harm American credibility. This credibility extends beyond the space program to all areas of cooperation and international exchange. The reputation of a country, informally its "word," is an amorphous concept. It may be defined as credibility internationally and the willingness of other states to accept an actor's promises. Both are based on keeping commitments: "The credibility of the United States as a partner is based on its ability to make durable commitments."[125]

Maintaining national credibility is important to ensure cooperation beyond the SSP. Therefore, participation by other states was a form of pressure on domestic actors. NASA officials could argue that scheduling changes would adversely affect the partners' programs. Breaking an agreement will make future ones more difficult: "Cancellation of Space Station Freedom because of inadequate funding would send a clear signal to other nations that the United States is not a reliable partner, not only in space ventures, but in other areas as well. That is not the message America wants to send out."[126]

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[124] NASA, *Space Station Freedom: Strategic Plan 1992,* 26.
[125] James Baker, "Letter From James A. Baker, III to Clairborne Pell, Chairman, Committee on Foreign Relations, United States Senate, July 1, 1991," (Washington: NASA Historical Collection, 1991).
[126] Richard Truly, "Excerpts From Remarks Prepared For Delivery: Pathway to the Planets Conference, Washington DC," (Washington: NASA Historical Collection, 1989).

Cooperation is not limited to space: "We will increasingly need to cooperate with these allies on common endeavors, whether in security, economic, environment, or science and technology areas."[127] James Fletcher said in 1988 that, "[canceling the SSP] will raise questions about our reliability as an international partner. This especially applies to the Europeans, Japanese, and Canadians."[128]

A 1989 NASA document warned that:

> A slip in our schedule would automatically slip those of our international partners. The partners, committed to complementary development programs equivalent to $8 billion, would be impacted several hundred million dollars. In effect, the U.S. would be unilaterally making decisions that would increase their costs. More broadly, if the U.S. now chooses to delay the program again, it would call into questions our commitment to it, and consequently, our commitment to the partners.

Later in the same document, the NASA author warns about the effect that budget cuts would have the SSP and "future joint international efforts."[129]

Richard Truly stressed this point to Congress during the critical 1991 hearing held after the Station's budget had been zeroed out by a House committee: "If we renege on these international obligations, America's word will be in question. The international ramifications of our backing out of these

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[127] Baker, "Letter From James A. Baker, III to Clairborne Pell,... July 1, 1991."
[128] NASA, "Fletcher Statement on Senate Funding Decision For Space Station," (Washington: NASA Historical Collection, 1988).
[129] NASA, "Space Station Impact If Funding Were Cut" [Covered With Note From James Fletcher to Richard Darman], (Washington: NASA Historical Collection, 1989).

agreements cannot be exaggerated."[130] Betraying the trust of the partners mean that the US would "pay a huge penalty, but not in the sense of dollar terms," but in lost trust.[131]

George Brown voiced the same sentiment in a 1991 Congressional hearing. Brown warned that the decision made by an Appropriations Committee to cancel the SSP would be "a decision to change directions now goes far beyond the normal stop-start phenomenon that has been the unfortunate hallmark of space development projects. It may signify a fundamental shift away from the manned Space Program and a major turning point in our efforts to cooperate with other nations on big science projects."[132] Brown echoed the NASA argument, claiming that "[canceling SSP] also would signal to our international partners that the U.S. is not a reliable cosponsor of science and technology ventures. The Space Station is the largest such cooperative project in the world, and in many ways is a test of our willingness and ability to be a responsible participant in the international science and technology community."[133]

Breaking promises also has a moral dimension, as one does not wish to be unfair or untrustworthy to one's friends: "We will have to renege on our agreements with our international partners... Our friends and allies have already spent $1 billion on preliminary studies, and plan to spend a total of $8

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[130] US Congress, *Impact of the Space Station Cancellation*, 45.
[131] US Congress, *Impact of the Space Station Cancellation*, 77.
[132] US Congress, *Impact of the Space Station Cancellation*, 1.
[133] George Brown, "Statement of George Brown III," (Washington, 1991).

billion more as their share of station costs. Pulling the rug out from under them at this stage would cause chaos in their respective space programs and further repercussions that will affect America's international relationship as a reliable partner."[134] William Lenoir[135] made a similar point in a Congressional hearing in 1990: "[the partners] have a tendency, especially the Europeans, to essentially be fully funded, that means that it is more important for them to meet a schedule because if they bust that schedule, it is going to cost more and they may not have more. So they care, and it would impact them significantly."[136] This argument is seen in statements calling for fiscal stability as well as Station survival: An unstable funding environment also jeopardizes participation by the international partners."[137]

In Congress, James Sensenbrenner used this argument in two statements during a 1991 hearing:

> I think the Congress is effectively stiffing our allies between $2.25 billion and $2.5 billion in U.S. dollars. That is a rather large amount of money and is going to have severe international consequences, not only in terms of scientific cooperation, but also in terms of the foreign policy of the United States in other areas.[138]

> If the U.S. Congress should unilaterally pull the rug out of this endeavor, the billion dollars that has been spent on behalf of European and Canadian and Japanese taxpayers will go down the drain, and no foreign country will want to cooperate with the United

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[134] James Fletcher, "Excerpts From Remarks Prepared For Delivery: NASA Press Briefing; Kennedy Space Center," (Washington: NASA Historical Collection, 1988).
[135] Then Associate Administrator for Space Flight.
[136] US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *NASA Authorizations* (Washington: US Government Printing Office, 1990), 116.
[137] NASA, *Space Station Freedom: Strategic Plan 1992,* 32.
[138] US Congress, *Impact of the Space Station Cancellation*, 107.

> States on any space program like the EOS [Earth Observation System] Program or other scientific programs like the Superconducting Supercollider, because we will have taught them a very expensive lesson that America is an unreliable partner.[139]

Station advocates also warned that instability in the SSP would drive the partners to work together without the US, "[o]ur space station partners might even choose to stop playing in a game that we control which continues to raise their costs, and choose instead to develop their own autonomous space station capabilities, or cooperate with each other or the Soviets."[140] William Lenoir reported to *Aviation Week* that Japanese officials had told Administrator Truly that they would build their own space station if the US canceled the Freedom program.[141]

Testifying before Congress, Richard Truly said that:

> If the United States walks away from its leadership role in Space Station Freedom, it is going to leave a huge- pardon the term- vacuum in the worldwide, international space arena. That vacuum is going to be filled. Whether it would be filled by the nations that are currently our partners or by them joining others, it would be hard for me to predict. But the price we would pay is that I think it would be very difficult to imagine how they would fill it in a partnership with us.

Responding to Truly's comment, Chairman Brown asked if the partners could join with the Soviet Union to create a "new European-Soviet-Japanese-Canadian partnership." Truly answered that it was "conceivable."[142]

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[139] US Congress, *Impact of the Space Station Cancellation,* 13.
[140] NASA, "Space Station Impact If Funding Were Cut."
[141] Patricia A. Gilmartin, "Bush Administration Rallies Support For Space Station as Crucial Votes Near," *Aviation Week and Space Technology* (27 May 1991), 25-6.
[142] US Congress, *Impact of the Space Station Cancellation,*78-9.

The partners themselves also used this argument to pressure the US to keep its commitments. Such veiled threats were made directly during a 1991 Congressional hearing. European and Japanese officials reiterated their interest in continuing the project, even if the US decided to pull out. ESA's Director General Jean-Marie Luton told the Congressional panel that cancellation of the SSP would be a "real ghost inside all European memory."[143] He further stated that ESA would need to reevaluate its cooperative program with the US. The Japanese representative, Kenji Funakawa, also suggested Japan would seek to develop its own piloted space program.[144] Just before the hearing, the partners had issued a terse joint communiqué that berated Congress for threatening to cancel a project begun at the initiation of the US: "all partners had reoriented their priorities [and] have invested substantially in the program, in good faith... The agency heads were unanimous in expressing their disbelief that the U.S.A. would now consider withdrawing from such an important international venture thereby effectively terminating the program."[145]

Dan Goldin, in a 1994 interview glossed over disputes with the partners over the Space Station as irrelevant to the broader purpose. Referring specifically to Canadian participation, Goldin said, "Now, what I can tell you is; we in America, can't get along without [the Canadians]. We made a

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[143] US Congress, *Impact of the Space Station Cancellation,* 105.
[144] US Congress, *Impact of the Space Station Cancellation,* 109.
[145] *Joint Comminiqué by NASA's Space Station Partners* (Washington: NASA Historical Collection, 1991), 1.

commitment decades ago to use the Canadians for the robotic activity. At the most senior, I said, 'look, we need you. It's not that you need us. We need you.' Somehow, we're going to find a way of working."[146] The thrust of Goldin's argument was that the nation must keep its word, a concept he often used: "America made a promise to Canada, Europe, and Japan to build the station in exchange for a significant contribution from them. Going back on our word would mean giving up our role as the world's leader in space."[147] The participation of the partners was not optional, but essential for the SSP plan. Once the US pledged to build the Space Station, it was committed and could not lightly abandon its partners. International cooperation was a limiting, as well as enabling, enterprise.

The Cooperative Context: Discussion

Reference to international cooperation tempers the nationalism seen in the space policy discourse. An appeal to the interests of a broader community supports the notion that it is *human* destiny to settle space. International cooperation also benefits the narrower US interest in redefining world politics in the wake of the Cold War.[148] However, this argument is not intended to contradict warnings of international competition. Concerns about technology

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[146] Daniel Goldin, "Interview With Teresa Foley (Space News)," (Washington: NASA Historical Collection, 1993).
[147] Daniel Goldin, "The Future in *Freedom*; The Future is Now, Remarks to the National Space Club," (Washington: NASA Historical Collection, 1994).
[148] NASA, *International Space Station Fact Book 1995* (Washington: NASA, 1995), 7.

transfer and relative gains temper references to cooperation.[149] In addition, cooperating with potential rivals would help to tie those states' space programs more closely to the US: "foreign participation [in the SSP] would continue to link other countries' space programs to the Shuttle, thus strengthening the STS and diverting investments from competing systems."[150]

Cooperation is always placed in the context of American leadership. When the US is the leader or first among equals, international cooperation ensures both human destiny and American interests. Even cooperation with competitors is preferable to competition with no cooperation.[151] America's greatness and national destiny are intertwined with the presumed interest and destiny of all Humankind. George Bush may have regarded the Space Station as the "promise of man," but in the same passage he proclaimed the linkage between "the majesty of space with the greatness of America."[152]

Cooperation is described in a normative fashion as well. Several authors of NASA texts speak of an international tradition at NASA.[153] Philip Culbertson wrote in 1985: "The Space Station will continue this tradition of international

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[149] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Eurospace/Aerospace America Symposium," (Washington: NASA Historical Collection, 1987).
[150] James Beggs, "Suggested Remarks, Space Science Board Meeting," (Washington: NASA Historical Collection, 1982).
[151] Richard Truly in, US Congress, *Impact of the Space Station Cancellation*, 80.
[152] George Bush, "Remarks on Greeting the Crew of the Space Shuttle Discovery," In *Public Papers of the Presidents of the United States: George Bush 1989. Book I, January 20 to June 30, 1989* (Washington: U.S. Government Printing Office, 1990), 311.
[153] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Eurospace/Aerospace America Symposium," (Washington: NASA Historical Collection, 1987). Robert F. Freitag, Robert V. Lottmann, and Lynette D. Wigbels, "Space Station: The World Connection," *Aerospace America* (September 1984), 77; NASA, *Space Station Freedom Media Handbook* (Washington: NASA, 1989), 5.

cooperation in space."[154] The numerous (over 1000) agreements signed between the United States and 100 other countries is cited as evidence of that tradition.[155] Andrew Stofan in 1988 referred to such a tradition: "NASA expects to continue the U.S. tradition of conducting cooperative space endeavors with other countries. In addition to obvious foreign policy benefits, international participation in the Space Station Program means a more capable Space Station."[156]

The international element of the SSP was also important for some members of Congress, especially California liberal George Brown. Brown was a physicist by training and an active opponent of SDI. In speeches and articles he outlined his vision of what the space program should be. Cooperation was a key element of this view, as was an image of acting as a "good ancestor" to future generations. Brown praised the value of the then *Freedom* project as a step towards an international future: "Space Station Freedom will be a legacy of the human spirit from our generation to all future generations... This is a goal to which all nations, working together, must contribute, and to which all nations

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[154] Culbertson, *Space Station: A Cooperative Endeavor* (Washington: NASA Historical Collection, 1985).
[155] This figure was noted in several texts including: Kenneth Pedersen in, US Congress, House of Representatives, Committee on Science, Space, and Technology, *International Cooperation and Competition in Space* (Washington: Government Printing Office, 1984), 33.
[156] Stofan, *Space Station: A Step into the Future.* (Washington: NASA, 1988).

ultimately aspire. It is the way in which we can demonstrate a new commitment to being good ancestors."[157]

However, goodwill is not enough, as technology transfer is a specter that haunts international cooperation. In Congressional hearings, technology transfer has proven to be a persistent issue. Concern about the economic potential of US allies, especially Japan, has been a recurrent theme, particularly in Congress.[158] The reality of economic competitiveness requires reassurances about technology transfer. NASA publications balance references to cooperation with reassurances of safeguards against "unwarranted transfer of U.S. technology."[159] Advocates of international cooperation must include reassurances about technology transfer and the ability of the US to benefit more than its competitors/partners. Kenneth Pedersen warned that: "it is important, however, not to let our concerns about competition and technology transfer make us loose sight of the importance of cooperation. First, increased capabilities abroad mean that other nations can be more capable partners, thus increasing the benefits to be derived from cooperative ventures... Furthermore, cooperative programs, properly structured, need not result in adverse transfer

[157] George Brown, "A National Space Program: Redefining the Future: Remarks By The Honorable George E. Brown, Jr. At The National Space Club," (Washington: NASA Historical Collection, 1993).
[158] Bill Nelson (D-FL) stated in 1983: "We have turned over technology under the name of free enterprise to Japanese... I think we've just got to be careful that it doesn't- in the name of international goodwill- that it doesn't turn around and come back and slap us in the face." US Congress, *NASA's Space Station Activities*, 113.
[159] Beggs, *Space Station: The Next Logical Step* (Washington: NASA, 1984), 3.

of technology."[160] In 1983, Hans Mark defended joint ventures with economic rivals in the following manner:

> Because of our technical superiority in this case- that is- because we are far ahead of potential collaborators (and eventual competitors) in this technology, we can afford to invite international collaboration to gain political advantages that we deem to be important. There will, of course, be technology transfer, but it will not be disadvantageous in the near term since the technology gap between ourselves and our collaborators will be large enough to make immediate applications difficult.[161]

James Beggs, when promoting the space station idea in 1983, stressed that cooperation did not have to mean danger: "With care and commonsense, however, we can continue the benefits provided by international cooperation in space, yet accommodate legitimate concerns with technology transfer."[162] The following year, Beggs advocated cooperation but warned that the partners would seek "technological advantage or some industrial advantage. It will be a tough negotiation in that respect. We will have to be very careful." However, he continued, "We have had a lot of experience in setting up international cooperative endeavors... the United States has gotten at least as much benefit from the collaboration that we have done with our friends abroad as they have received from us."[163]

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[160] US Congress, *International Cooperation and Competition in Space,* 35.
[161] Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983).
[162] US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *Civil Space Station* (Washington: Government Printing Office, 1983), 29.
[163] US Congress, *NASA Authorization for Fiscal Year 1985,* 12.

Cooperation is a key dimension of the SSP discourse but is always balanced by the goal of American leadership. A month after Ronald Reagan initiated the SSP, Beggs told a Congressional panel: "Inherent in this proposal is the President's vision of the future which embodies continued U.S. leadership in space technology, space exploration, and the commercial uses of space while simultaneously encouraging international cooperation."[164] This does occasionally creates tensions and commits the US to a twin track policy of working with its competitors, preparing itself against the actions of its partners, simultaneously.

Time Specific Arguments

Arguments Employed During the Cold War 1980-1990

The arguments discussed thus far appear across the entire period studied (1980 to 1998). The exact arguments have evolved but the twin focus of international cooperation balanced with nationalism and economic competition has been fairly consistent. The Cold War, however, was the prism through which the Space Station Project was filtered. Special arguments were seen only in the Cold War period (1980 to approximately 1990) and were then replaced by a different set of arguments. In the Cold War the Soviet Union was

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[164] US Congress, *NASA Authorization for Fiscal Year 1985*, 5.

an adversary state that need to be challenged. After the Soviet Union collapsed and was succeed by an allegedly democratic Russia, new arguments emerged.

The Space Race Reprised

Space race terminology never faded from Cold War space policy discourse and Soviet advancements in human space flight were a very visible phenomenon in the 1980s. George Low's NASA Transition Report contrasted American past leadership with rising competition from the Soviet Union, competition that was political, economic, and military.[165] Space remained a visible Cold War challenge: "This accomplishment is worthy of considerable respect and indicates the Russians' long-term commitment to the exploration of space and the development of manned space operations."[166]

As the SSP campaign warmed up, the Soviet threat was very much part of the message. In 1983 a House committee was given a presentation on the need for a space station. Despite a clear denial by John Hodge that the project was not "reactive," the Soviet lead in space stations formed a key component of the testimony. According to the testimony, a space station would "position [the] US to meet [the] Soviet challenge" in space stations and that space is "a

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[165] George Low, "George M. Low, Team Leader, NASA Transition Team, to Mr. Richard Fairbanks, Director, Transition Resources and Development Group, December 19, 1980, With Attached: 'Report of the Transition Team, National Aeronautics and Space Administration'" (NASA History Office [Web Page]), http://www.hq.nasa.gov/office/pao/History/low80.html, 2.
[166] NASA, Office of Space Station, "The Space Station: A Description of the Configuration Established at the Systems Requirements Reviews (SRR)," (Washington: NASA, 1986).

competitive arena where the stakes are enormous."[167] The same year, Philip Culbertson wrote in *Air and Space* magazine about the national security threat posed by Soviet space station and launcher advances.[168] The message of these statements was the need to compete with the Soviet Union in space. Because the Soviet Union was active in space, US national interests demanded a similar effort. The need to challenge the Soviets in space remained a mantra of Space Station defenders in the early 1980s.

Competition with the Soviets in space had a material as well a theoretical dimension. Soviet space station activities created an impressive record of continuous space flight. The *Salyut* series of space stations culminated with *Salyut 7*, which had supported multiple crews of Soviet and international "guest" cosmonauts. The *Mir* station, launched in 1986, was the largest and most ambitious of the Soviet space stations, designed for evolutionary growth and a variety of scientific activities. For a time the Soviet Union had two functioning space stations, albeit briefly, for *Salyut 7* was eventually shut down. The presence of two Soviet space stations was used to sound a warning of an expanding Soviet presence in orbit: "With the Soviet Union already operating two orbiting stations, the [US] Space Station

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[167] US Congress, *Space Station Activities* (Washington: Government Printing Office, 1983), 4. In a follow up answer by NASA states more clearly "we are not in a 'race' with the Soviet Union" (85).
[168] Culbertson, "Space Station: The Next Step in Space?"

symbolizes the intent of the United States to be second to none in utilizing the diverse capabilities of a permanent human presence in space."[169]

In the pro-SSP literature, the Soviet space program was tie to that country's ideology and foreign policy, and often couched in sinister terms. "The Soviet Space Station Challenge," a slide that was part of a NASA Congressional briefing book, montaged pictures of Soviet space hardware with a photo of a statue of Lenin.[170] The tone of the description often matches the state of US-Soviet relations. In 1983, during the height of "second Cold War," Hans Mark easily linked Soviet space station activity to a broader purpose: "I expect the competition with the Russians to continue since they will not give up their ambition to dominate the world and will continue to view space operations as an important symbol of their ability to achieve this objective."[171] Soviet activities were described as long-term and ambitious. American officials predicted Soviet goals included the development of heavy lift vehicles and a space shuttle.[172]

The Soviet Union a leader in space and the space race was still alive, despite US technology. James Fletcher grieved in 1988 that "[I]t is becoming increasingly clear that in the manned space arena, we have lost leadership to

[169] NASA, *Space Station: A Research Laboratory in Space* (Washington: NASA, 1988); see also James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Press Club," (Washington: NASA Historical Collection, 1988).
[170] "Space Station Notebook," (Washington: NASA Historical Collection, 1988), Slide HQ S86 253 (3) Rev. 11-19-86.
[171] Mark, "[Speech to] American Institute of Aeronautics and Astronautics."
[172] Each of these rumored projects did see fruition in a limited way. The *Energia* heavy lift vehicle and the *Buran* shuttle each saw limited use in the late 1980s.

the Soviet Union."[173] James Beggs reported in 1983 "while we cannot predict what the Soviets will do in the next 10 years, we can make one prediction, and that is that they will continue to advance in this area [space stations], because they have developed step by step in the last 10 years. They fly a lot. And we can anticipate that they will continue to fly."[174]

Although described as a threat, Soviet activities were useful in demonstrating that permanent space stations were feasible and valuable: "A Space Station is both a powerful symbol and a powerful tool. Its value as a means to leadership is evident. The Soviet Union must certainly understand this, for the Russians recently launched the core element of what they say is a modular space station [*Mir*] intended to be permanently manned."[175] Senator Howell Heflin (D-AL) said in 1983 "space stations are an idea whose time has come. First of all, space stations are not just an idea. They are a reality; at least they are in the Soviet Union. Their space program continues to march along..."[176] John Hodge made a similar point in 1985: "Recognizing the need for having men on station in orbit around the earth, the Soviet Union has developed the Salyut class of vehicle to serve both civil and military needs.

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[173] Fletcher, "Excerpts From Remarks Prepared For Delivery: National Press Club."
[174] US Congress, Senate,. Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *Civil Space Station* (Washington: Government Printing Office, 1983), 34.
[175] Stofan, *Space Station: The Next Logical Step* (Washington: NASA, 1987), 1.
[176] US Congress, *Civil Space Station*, 3.

With Salyut 6 launched in 1977 and Salyut 7 lunched in 1982, the Soviets have demonstrated an impressive operational space station capability."[177]

Even as the Cold War began its slow thaw, Soviet space activities were still presented as a threat to the national future. In an ironic twist, as the US withdrew from space activities during the post-*Challenger* hiatus, the Soviet Union began to promote itself more as a provider of *commercial* space services. James Fletcher, NASA Administrator during this difficult period, continued to stress the Soviet challenge: "While the hiatus in United States space activity is temporary, the growth in Soviet programs is neither temporary nor illusionary."[178] The Soviet program was still ambitious enough to threaten American leadership: "It is a commitment to a large and robust program, to national investment policy that stresses continuity of support, high quality of resources and willingness to forego near-term for long-term returns. In short, it is a commitment to leadership in space."[179]

In 1988 Fletcher warned that American leadership in space continued to be threatened by Soviet advances: "the stakes are very high indeed. To let the chips fall any other way would be playing Russian roulette with our future. The Soviet Union is in space to stay... Even if all goes as planned and we have a permanent presence in orbit by the mid 1990s, we still will be at least a decade behind the Soviets, whose space stations- beginning with Salyut- have been in

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[177] Hodge, *A Space Station For America* (Washington: NASA, 1985).
[178] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Los Angeles World Affairs Council," (Washington: NASA Historical Collection, 1987).

orbit since 1971."[180] Richard Truly echoed the words of his predecessor: "The Soviet Union has had its form of a space station in orbit for about a decade."[181] Even in the last months of the Soviet Union, the specter of the Soviet space program could still used as a justification. Richard Truly told Congress in April 1991 that, although he saw cooperation as possible, "the Soviets have over the years continued to have an aggressive space program and even though they are undergoing severe budget shortfalls and difficulties at this time... they show no signs from backing away from their space program across the board."[182]

Racing the Allies?

The specter of international competition during the Cold War was not limited to the Soviet Union alone. Along with references to Soviet competition were allusions to American allies and trading rivals as participants in a new space race. James Fletcher drew few distinctions between America's rivals in 1987: "When we find ourselves running just to keep in place, while others- both friends and adversaries- forge ahead, clearly, not only our leadership in space, but our national prestige and future prosperity are in jeopardy."[183] One

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[179] Fletcher, "Excerpts From Remarks Prepared For Delivery: Los Angeles World Affairs Council."
[180] James Fletcher, "Excerpts From Remarks Prepared For Delivery: National Space Club," (Washington: NASA Historical Collection, 1988).
[181] US Congress, *Impact of the Space Station Cancellation*, 67.
[182] US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *NASA's Plan to Restructure Space Station Freedom* (Washington: Government Printing Office, 1991), 43.
[183] James Fletcher, "Excerpts From Remarks Prepared For Delivery: Annual Convention of the American Institute of Aeronautics and Astronautics, Arlington, Virginia," (Washington: NASA Historical Collection, 1987).

Congressional witness warned that another nation might "steal the march on us" if the US delayed its space station plans.[184]

SSP advocates have used the activities of other states to generate a sense of urgency. NASA officials hinted at the possibility that the allies could find the Soviet Union a preferable partner to the US. Hans Mark told Congress that French interest in human space flight was not limited to cooperation with the US: "[French officials] said, we will either participate in that activity with the United States, or if the United States does not want, we will do it with the Soviets."[185]

Concern about the allies were often expressed by members of Congress, who have identified the international partners as threats to US technological preeminence. Representative Harold Volkmer (D-MO), in a 1990 Congressional hearing, lumped Europe and Japan in with the USSR as space competitors.[186] These associations suggest that a national threat may come from economic rivals, despite the fact that those same rivals were also SSP partners. The image created is of allies and adversaries so committed to space as to be willing to assume the position of leader should the United States hesitate. In advocating the Space Station in 1983, Howell Heflin warned that

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[184]Peter Wood in, US Congress, *Civil Space Station*, 9. Wood represented consulting firm Booz, Allen, and Hamilton Inc., which had been hired by NASA to do economic analyses of space projects.
[185] US Congress, *NASA Authorization for Fiscal Year 1985*, 18.
[186] US Congress, House of Representatives, Committee on Science, Space, and Technology, Subcommittee on Space Science and Applications, *The Future of the US Space Program* (Washington: Government Printing Office, 1990), 1.

"[w]e should not relinquish our technological preeminence to Russians, Europeans, Japanese, to anyone."[187]

In a humorous but telling exchange, George Brown, commented that he wished that his colleague, Ralph Hall (D-TX), had not remarked that Japan and the USSR might join forces in space should the US cancel the Space Station. Brown stated: "I wish you hadn't suggested that... they're liable to take you up on it."[188] Earlier in the same hearing, Representative Hall had raised the specter of American allies acting on their own and he singled Japan out as a specific threat: "[people in the aviation industry] better fear Japan and some of our other good partners such as Japan looking skyward and taking over the space program."[189] In the same hearing Representative Jim Bacchus (D-FL) said, "[if] our friends and allies who have wanted and sought to cooperate with us in Space Station Freedom will be left to their devices. It seems to me that they'll probably come together and try to build a space station themselves, and then maybe we can borrow it from time to time."[190]

In another exchange, Representative Bill Nelson (D-FL) asked NASA's Kenneth Pedersen if Europe and Japan could collaborate on a space station independent of the US should the partnership fail. Pedersen replied, "That is speculative... I would have to guess right now that it would be a high likelihood that they would move toward something that would give them some of the

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[187] US Congress, *Civil Space Station*, 3.
[188] US Congress, *Impact of the Space Station Cancellation*, 83.
[189] US Congress, *Impact of the Space Station Cancellation*, 10.
[190] US Congress, *Impact of the Space Station Cancellation*, 70.

capabilities that a space station like the one we envision would provide. But I must say that is speculative. There is also, of course, the possible option of some form of cooperation with the Soviets."[191] This possibility of the allies cooperating with the USSR in space was depicted as threat to American interests and pride: "if you look through the sky and on to space, and should [the Japanese and Germans] link up or hook up with the Russians... where would this country be[?]"[192]

Western Cooperation

Despite these concerns, a key major argument in favor of the SSP was cooperation with US allies to strengthen the Western Alliance. As we have seen, "international cooperation" was part of the SSP from Reagan's State of the Union Address. The inclusion of US allies as partners fit in well with the spirit of the decision-making process. The underlying political, economic, and military relationship with Canada, Europe, and Japan made the partnership easier.[193]

The Soviet threat required a vigorous response from the allies and their leader. This version of the "space race" cast the United States as the leader of the "free world;" American actions were presented as representing a broader interest. As the primary Western actor in space, the US had a responsibility to

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[191] US Congress, *NASA's Space Station Activities*.
[192] Ralph Hall in, US Congress, *Impact of the Space Station Cancellation,* 83.
[193] John Logsdon, "International Cooperation in the Space Station Programme," *Space Policy* (February 1991), 35.

its allies. Cooperation with American allies would help to strengthen "free world ties."[194] Like many of the arguments discussed here, this was not original. In 1971, James Fletcher (then NASA Administrator for the first time, 1971-77) defended the importance of the nascent Shuttle program as part of America's "*responsibility- to itself and to the free world-* to have a part in manned space flight."[195] The US space program in this context becomes a "Western" endeavor with a broader national security value.[196]

NASA stressed the alliance-strengthening benefits of long-term high-tech cooperation: "The Space Station will also be: a striking example of Free World unity and capabilities."[197] Cooperation in the SSP would help to solidify the "Free World" partnership between the US and its allies: "a space station with international participation is preferable to a purely U.S. facility, not only to enhance the station's utility, but perhaps more important, to symbolize dramatically the vitality and strength of the free-world alliance."[198]

The fact that the partners were capitalist democracies was another ideological plus: "space will shine as an outstanding area of cooperation

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[194] NASA, *The Best We Can Be* (Washington: NASA, 1989).
[195] James Fletcher, "The Space Shuttle," In *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. I: Organizing For Exploration*, John Logsdon and others, eds. (Washington: NASA, 1995), 556.
[196] Outside of government, space policy writer Wulf von Kries noted in 1987, "a joint space station undertaking would become a new symbol of allied understanding, an energizer of both technological and institutional innovation, a force the West is rightly proud of." (Quoted in, Logsdon, "International Cooperation in the Space Station Programme," 39).
[197] Culbertson and Freitag, *The Partnership: Space Shuttle, Space Science, and Space Station*, 1.
[198] Beggs, *Space Station: The Next Logical Step*, 3; Culbertson and Freitag, *The Partnership: Space Shuttle, Space Science, and Space Station*, 1.

between the free peoples of this planet."[199] James Beggs in 1982 said "a space station could be the logical catalyst for a great new international cooperative venture for the Free World. It could serve to focus the intense interest and capabilities in space that our allies in Europe and this continent as well as Japan already have. And it could provide a mutually beneficial cooperative project to cement Free World ties."[200] In the same year Beggs put the same thought more succinctly: "there would be strengthening of already-existing scientific[,] political and strategic ties."[201] Cooperation in the SSP was also a form of alliance burden sharing, as Kenneth Pedersen claimed: "the United States looks to its friends and allies to share both the benefits and the burdens of remaining free-world nations."[202]

"Free World" style arguments were used throughout the Cold War to promote the SSP. NASA documents and officials spoke of the need for the "Free World" to reach into space and challenge the Soviets in space station activity. In 1984 Kenneth Pedersen promoted the SSP to ensure "free world space operations" and "free world leadership."[203] The same year, James Beggs argued that the Space Station would "symbolize dramatically the vitality and

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[199] Ronald Reagan, "Remarks at the National Space Club Luncheon," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1985 Book II, January 1 to June 28, 1985* (Washington: US Government Printing Office, 1988), 365.
[200] James Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society," (Washington: NASA Historical Collection, 1982).
[201] James Beggs, "Suggested Remarks, Space Science Board Meeting," (Washington: NASA Historical Collection, 1982), 8.
[202] US Congress, *International Cooperation and Competition in Space*, 35.
[203] US Congress, *International Cooperation and Competition in Space*.

strength of the free-world alliance."[204] A 1988 NASA promotional booklet for the Space Station referred to several "Reasons Why" the Station needed to be built. The final reason listed (in bold print and in larger type than the others) was the need to "Assure Free World Leadership in Space During the 1990's and Beyond."[205]

Military Uses of the Space Station

One proposed SSP mission was never detailed by NASA but did appear frequently in the early 1980s. NASA attempted to expand the base of support for the SSP by enlisting support from the military. Use of the Space Station by the American military was mentioned in the SSP literature, although specific functions were not described. The exact military mission of the SSP was therefore rather vague. Some specific missions suggested included surveillance, servicing of space assets, command and control.[206]

Military uses of Soviet space stations were reported by advocates of the SSP to heighten their significance.[207] The operation of these Soviet space stations were also endowed with generic military value. Material processing and extravehicular activity "have a military bearing as well as a civil bearing."[208] The Defense Department itself identified several vague military missions for an

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[204] Beggs, *Space Station: The Next Logical Step,* 3.
[205] NASA, *Space Station: A Research Laboratory in Space.*
[206] Culbertson, "Current NASA Space Station Planning."
[207] Beggs, "Why the United States Needs A Space Station: Remarks, Detroit Economic Club and Detroit Engineering Society," (Washington: NASA Historical Collection, 1982).
[208] James Beggs in, US Congress, *Civil Space Station,* 40.

American space station. The Space Station would allow "new capabilities to accomplish in-space military related research and development."[209] Operational missions include intelligence observation, battlefield management, monitoring space for military activities, and support of military space infrastructure.[210]

However, when these ideas were published, DoD involvement was no longer advantageous to the program. In fact, NASA never wanted extensive military use of the SSP, and noted that the orbit planned for the Station would not be a "particularly useful orbit for military operations."[211] Rather, the Space Station was defined by NASA as a "national asset" *available* to the Department of Defense for *peaceful* purposes.[212] NASA was always reticent about the military uses of the Station. Andrew Stofan wrote in 1987: "The Space Station is a civil endeavor of the United States. The President approved the program based upon civil requirements and the Department of Defense is not a program participant. However, the Space Station will be an extremely versatile national asset, and NASA believes that in the future it is quite possible that the Department of Defense might well utilize the Space Station's research capabilities."[213] Similarly, Stofan wrote in 1988: "Clearly, the Station will be a national asset, but there must be no doubt that it will be used for peaceful

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[209] Frank Carlucci, *A Report to the Committees on Armed Services of the Senate and House of Representatives on Potential Department of Defense Use of the Permanently Manned Space Station* (Washington: Department of Defense, 1988), 1.
[210] Carlucci, *A Report to the Committees on Armed Services...*, 3-7.
[211] James Beggs in US Congress, Senate. Committee on Commerce, Science and Transportation. Subcommittee on Science, Technology, and Space. *NASA Authorization for Fiscal Year 1985.* Washington: Government Printing Office, 1984b. p. 14)

purposes consistent with our commitment to the peaceful uses of outer space... [DoD] use, like all use, would be for peaceful purposes."[214]

As noted in Chapter 5, the DoD actually showed little interest in space stations, and generally opposed the SSP. Military attendees of 1983 NASA-sponsored symposium expressed doubts that space stations offered any significant military value.[215] Under Secretary of Defense Richard DeLauer stated, "there are no currently identifiable DOD requirements that could be uniquely satisfied by a manned space station. Further, no current DOD requirements would appear to provide a significant improvement to DOD over alternative methods."[216] Air Force official Charles Cook stated more baldly, "a space station might (and I stress the word MIGHT) eventually prove worthwhile militarily. The possible space station operations that might have military utility have yet to be proved to be economical or technically feasible and there are no validated military requirements."[217] The same year a memorandum from General Richard Stilwell summarized the DoD position: there were no missions

[212] Beggs, *Space Station: The Next Logical Step*,3; Stofan, *Space Station: The Next Logical Step* (Washington: NASA, 1987), 1.
[213] Stofan, *Space Station: The Next Logical Step*, 1.
[214] Stofan, *Space Station: A Step into the Future.*
[215] Mireille Gerard and Pamela Edwards, eds., *Space Stations: Policy Planning Utilizations* (New York: American Institute of Aeronautics and Astronautics, 1983).
[216] Richard De Lauer, "Military Space Activities and a Space Station," In Gerard and Edwards 1983, 41. Theoretically space stations could conduct many of the same missions that satellites currently perform, such as intelligence gathering. An inhabited space station would be far more expensive than any satellite.
[217] Charles W. Cook, "National Security Implications of a U.S. Space Station," In Gerard and Edwards 1983, 147.

or activities that required or would be improved by an inhabited space station.[218] The military did state its intent to keep all options open and to continue to study the matter, which did not appear to be a ringing endorsement.

However, after the program had begun, the opinion of the Defense Department apparently changed. In 1987, Reagan's Defense Secretary Casper Weinburger began suggesting using the Station for military activities. Weinburger spoke of potential for weapons testing, especially SDI components.[219] Weinburger also began to voice concern about the "price" of international participation. In a letter to Secretary of State George Shultz, Weinburger commented on the on-going negotiations with the international partners and warned of "paying too high a price for international cooperation" in technology transfer and decision-making. Weinburger specifically rejected multilateral management of Station operations and the "concept of 'equal partnership" to displace either the reality or the symbol of U.S. leadership in the Space Station program." The letter concludes that the US should "be prepared to go forward alone if the price of cooperation is too high."[220]

Aviation Week's editor, Donald Fink, characterized the Weinberger letter as having an "unfortunate anti-foreign tone," and reported the anger of the

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[218] Richard Stilwell, "Letter to Robert C. McFarlane from Richard Stilwell, With Attachment, Department of Defense Requirements Review SIG (Space) Manned Space Station Study," (Washington: NASA Historical Collection, 1983), 1.
[219] Nathan C. Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992).
[220] Casper Weinberger, "Letter From Casper Weinberger to George Shultz," (Washington: NASA Historical Collection, 1987).

international partners.[221] The partners had agreed to DoD access to the Station but were opposed to use of the Station for military operations or to test SDI technology. There were also fears that the DoD might "take over" the project.[222] The military card was clearly not an asset to NASA.

The controversy over military use of the Station lingered. A 1988 DoD report submitted to Congress by Weinberger's successor Frank Carlucci stated that "the core U.S. Space Station as a national resource, dedicated primarily to civil space activities, but available to the DoD in accordance with national priorities and international commitments."[223] The report identified Earth observation, communications, in-orbit construction, and space debris management as possible defense uses of the Space Station. After 1988, there are no major statements promoting military activities on the Space Station. National security eventually disappears from the SSP promotional literature.

NASA found the issue of military use of the Station a dubious blessing. Members of Congress, especially George Brown, were opposed to military use, while the US partners were hostile to the idea.[224] The partners had unsuccessfully sought to keep the military out of the project entirely. The

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[221] Donald E. Fink, "Space Station Skirmishes," *Aviation Week and Space Technology* (20 April 1987), 11.
[222] "Pentagon: Warning Shot on Space Base: Weinberger Weighs Military Use, Is Wary of International Cooperation," *Washington Post* (10 April 1987), A25.
[223] Carlucci, *A Report to the Committees on Armed Services...*, 1.
[224] James Beggs, Interview With Author, 22 July 1999. The unease of the partners was recognized early in the SSP. Kenneth Pedersen reported this in 1982. Military uses of the Space Station was predicted to be problematic for the partners, especially Japan (Kenneth Pedersen, "Memorandum From Kenneth S. Pedersen to John Hodge, Strategy For International Cooperation in Space Station Planning," In *Exploring the Unknown: Selected Documents in the*

partners finally agreed to military access to the Station but were uncomfortable with military activity and adamantly opposed to weapon testing.

NASA needed to balance the two sides of this issue, maintaining DoD's right of access, while reassuring foreign and Congressional allies that the program would not be militarized. NASA even suggested that the Pentagon might want its *own* space station. Dale Myers, NASA Deputy Administrator made such a proposal in 1987.[225] While eventually disappearing from the NASA literature, the official policy has remained the same: the US military reserves the right to use the Space Station. After Russia joined the project, defense applications of the Space Station failed to warrant even a cursory mention in SSP texts. While the Pentagon secured the right to use the Space Station in the MOUs, no such use is anticipated.

The Cold War Context: Discussion

The Space Station project during the Cold War was a means to several ends. Although the Soviet Union was the primary international threat during the Cold War, there was a degree to which *all* space actors were potential dangers. In conjunction with arguments about the importance of the Western alliance, were warnings about the rising technological and economic power of Europe and Japan. James Beggs warned of increased competition in space in a

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History of the U.S. Civil Space Program. Vol. II: External Relations, John Logsdon and others, eds. (Washington: NASA, 1982), 90-100.

speech in 1982, "we have been joined by many nations and we now face growing and serious competition in space. That competition comes not only from our friends in Europe and Japan, but from the Soviet Union, which has repeatedly stated its intention to construct a permanently manned orbital facility." Yet the Soviet Union remained the greater threat. A few moments later in this speech, Beggs urged cooperation with those same competitors: "It is imperative that the United States and the Free World meet that [Soviet] challenge effectively and soon."[226]

The partnership produced tensions between the different goals of the SSP. These tensions were never fully resolved and continue to be reflected in the modern ISS. The need to both compete and cooperate with the partners was not mere doublethink. The SSP during the Cold War had two equally important political rationales: 1) the demonstration and promotion of American power to friend and foe; and 2) to wage the Cold War struggle of the "Free World" against the Soviet Union. In the pursuit of these goals, minor contradictions could be overlooked. Cooperation and competition became largely compatible.

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[225] Dales Myers, "Excerpts From Remarks Prepared For Delivery: Air Force Association National Symposium, Colorado Springs, Colorado," (Washington: NASA Historical Collection, 1987).
[226] Beggs, "Why the United States Needs A Space Station...," 6.

Arguments Employed at the End of the Cold War and After (1990 to 1998)

A New Era of Cooperation

At the moment the Cold War had clearly ended, the world seemed to have awoken from a bad dream with new optimism. While this proved not to be the "end of history," or the dawn of a "new world order," world politics presented new challenges. The US space program and the SSP were not immune to the broader changes occurring around them and new political rationales were needed. The 1992 *NASA Strategic Plan* eagerly embraced international cooperation as the mantra of the new era:

> In this unsettled world, cooperative international efforts take on a new importance. They bring stability, order, and a sense of shared experiences. People who work together are the most realistic about which areas are conducive for cooperation and which areas are applicable for competition. The Space Station Freedom program is an international effort that uniquely demonstrates humanity' common bond in reaching beyond our home planet.[227]

As the direction of national policy changed in the period between 1991-93, the promotional discourse for the Space Station shifted with it. The most important change was the shift in emphasis away from the Soviet Union as a political-military rival to Russia as a strategic partner. The common phraseology that emerges is of the "new age," echoing George Bush's "New World Order." The later years of the Bush Administration saw more calls for US-Russian cooperation. The election of Bill Clinton in 1992, initiated the formal inclusion of

Russia into the SSP. The inclusion of Russia in 1993 completed the transition from Cold War to post Cold War justifications.

The Clinton Administration used the evolving Space Station project as a symbol of the changing superpower relationship. A Presidential statement published in 1994 remarked that the, "Space Station can serve as a model of nations coming together in peaceful cooperation... offering a vision of the new world in which confrontation has been replaced with cooperation."[228] A Vice Presidential statement in 1993: "No where will this partnership be so keenly felt as in the area of high-technology cooperation. Each of our countries spent the Cold War years pouring our resources into competition. So much was achieved, but at such a high cost. Now we can work together to advance a joint agenda in energy and space, science and technology, using our cooperation to keep costs down, husband our limited resources and work together for our mutual benefit."[229]

When directed to redesign the SSP in 1993, Goldin issued a statement that welcomed the challenge and linked space to the emerging new era of history: "the Century has been one long panorama of war and conflict. Now the world is changing, and with luck and with vision we may be able to replace a century of war with a new century of peace and understanding. Space cannot

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[227] NASA, *Space Station Freedom: Strategic Plan 1992,* 39-40.
[228] NASA, *Aeronautics and Space Report of the President:1994* (Washington: NASA, 1994).
[229] Office of the Vice President, Remarks by the Vice President in Signing Ceremony With Prime Minister Chernomyrdin," (Washington: Office of the Vice President, 1993), No Pg.

be left out of that equation, for space encompasses the essential challenges we will face in this new age."[230]

Statements on the 1993 agreements with Russia were glowing with hopes for a new age, an end of "ideological struggle" and "new partnership" between the superpowers.[231] Daniel Goldin spoke of a new era: "The end of the Cold War brings the opportunity for new partnerships never thought possible. Instead of competing against the Russians, we're exploring how we can work *with* them. If America could go to the Moon *alone*, just imagine what a *united* world could do."[232]

Goldin commented after Russia joined the SSP that, "For the first time since the dawn of the Space Age, the conditions that gave rise to space exploration have changed. Our presence on the space frontier began as a product of the Cold War, but that ideological struggle is now over. Cooperation will replace competition, and a new partnership in space between two former adversaries offers considerable economic advantages for both countries." Later in the same statement he noted, "In a larger sense, a truly international space program could signal a new era of peace and cooperation among nations."[233] The following year, Goldin said of the US-Russian agreements "This is a very

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[230] Daniel Goldin, "Administrator Goldin's Station Redesign Statement," *Station Break* (July-August 1993), 3.
[231] Daniel Goldin, "Statement by Daniel S. Goldin, Administrator, National Aeronautics and Space Administration, on the Cooperative Agreement Between the United States and Russia on Space, Aeronautics and Science," (Washington: NASA, 1993), 1; Office of the Vice President, Remarks by the Vice President in Signing Ceremony...," 1.
[232] Goldin, "The Future in *Freedom*; The Future is Now..."

important foreign policy initiative. It represents a profound change in our relationship with Russia, both in space and on Earth. We're learning to trust one another, to work together, to bring our talents together for all our children."[234]

Non-Proliferation of Military Technology

The new superpower relationship was presented by the Clinton Administration and NASA as an equal partnership. In reality, Russia was facing a critical and uncertain transition. US strategic interest required a stable Russia, at least in terms of security for the country's vast military-technical infrastructure. The 1995 *ISS Fact Book* stated that the Space Station would "channel the aerospace industry of Russia and other countries into nonmilitary pursuits to reduce the risk of nuclear proliferation and slow traffic in high-technology weaponry to developing countries."[235] Although Russia is politely cited along with "other countries," the SSP was now presented as a means to engage the high-technology industries of Russia in peaceful pursuits. The broader US policy goal of weapons non-proliferation was adopted as a justification for both continued expenditures for the Space Station and for the controversial incorporation of Russia. The State Department adopted this

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[233] Goldin, "Statement by Daniel S. Goldin... on the Cooperative Agreement Between the United States and Russia on Space, Aeronautics and Science." 1, 2.
[234] Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future...," 2.
[235] NASA, *ISS Fact Book 1995,* No Pg. This same or similiar statements were included in subsequent *Fact Books.* (NASA, *ISS Fact Book1997*; NASA *ISS Fact Book 1998.*

position in a Congressional hearing, describing the SSP as a way to "engage the defense industrial complex of Russia in civil cooperation."[236]

A specific linkage between the SSP and arms control was part of the 1993 agreements. In July 1993, the US and Russia agreed to Russian observance of the Missile Technology Control Regime (MTCR).[237] Russian participation in the SSP was contingent on Russian compliance with the MTCR.[238] This regime is a series of agreements signed by the leading producers of missile technology designed to slow the spread of ballistic missile technology to new countries.

The decaying condition of the former Soviet military arsenal and research establishment worried many policy makers after 1990. SSP advocates argued that helping Russia keep an active role in space would alleviate some of these problems. The Russian space industry would be less likely to export or immigrate its knowledge if it were kept busy, first on *Mir* and then on the SSP. Space Station work would also provide employment for thousands of Russian space technicians and scientists who might otherwise sell their skills to weapon-hungry Third World states. John Gibbons, Clinton's Science Advisor stated this idea in 1993:

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[236] James Collins, Senior Coordinator, Office of the Ambassador at Large For New Independent States in, US Congress, House of Representatives, Committee on Science, Space, and Technology, *1995 NASA Authorization (Space Station: Parts 1 and 2)* (Washington: Government Printing Office, 1994), 133.
[237] Marcia Smith, *NASA's Space Station Program: A New Focus- Foreign Policy* (Washington: Congressional Research Service, 1994), 2.
[238] Confidential Interview.

> We must recognize that this initiative in space cooperation fits in the context of a much broader partnership with Russia, a relationship that would define the post-Cold War era...The MTCR commitment is a strong signal that Russia has declared to be prepared to be a consistent and responsible partner, one that we can work with over the long term toward the mutual end of cutting down on weapons proliferation.[239]

The SSP therefore would serve to promote arms control, an increasingly important US foreign policy goal as post-Soviet Russia reconfigured its government and military. The Space Station would be part of a multi-front effort to discourage Russia from transferring valuable technology to would-be proliferators.

The Post Cold War Context: Discussion

The change from the Cold War to post Cold War environment was highly significant for the SSP. Old rationales of Free World solidarity and competition with the Soviet Union were replaced with positive platitudes about cooperation and a new era in history. This was not merely a shift to kind words. NASA asserted that definite positive benefits would flow from this new relationship. Most narrowly, cooperation would enable the US to access Russian extensive experience in space and long-duration space flight. This was to be achieved through the Shuttle-*Mir* program and other high level contacts. The US would

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[239] US Congress, House of Representatives, Committee on Science, Space, and Technology, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2* (Washington: Government Printing Office, 1993), 2; US Congress, *1995 NASA Authorization (Space Station: Parts 1 and 2)*, 137.

also gain access to the *Soyuz* as a crew return vehicle until NASA's own craft was ready.

However, not all of the promised benefits have materialized. The participation of Russia did not alleviate the fiscal difficulties of the Station. The $2 billion savings anticipated by NASA in 1993 did not emerge. The GAO reported in 1994 that most of the projected savings disappeared in additional costs, some of which were directly related to Russian involvement.[240] The political problems of the project did not change either. In fact, one particular ally of the SSP became highly critical of Russian participation. James Sensenbrenner attacked NASA and through it, the Clinton Administration, for the technical and scheduling problems produced by Russia.[241] The prospect of losing American jobs in the process of cooperation was another issue that resurfaced. Rising partisan conflict collided with frustration with Russia to make space policy less collegial than it had been in earlier years. While still supporting the project in general, Sensenbrenner and other Republican lawmakers were no longer automatic allies of NASA.

Democratization of Russia was possible argument that did not appear frequently in the literature examined. Russia was in a transitional phase and its democracy was considered by many to be unstable. Participation in a complex joint project could be seen as a form of support for Russia's embryonic

[240] General Accounting Office, *Space Station. Impact of the Expanded Russian Role on Funding and Research* (Washington: GAO, 1994), 4; General Accounting Office, *Space Station. Update on the Impact of the Expanded Russian Role* (Washington: GAO, 1994), 3.

democracy. However, NASA did not stress this point in Congressional hearings or in the *ISS Fact Books.* The idea was suggested however by other actors. Congressman Dana Rohrbacher (R-CA) suggested in Congressional hearing that "we should be moving forward with the Russians and trying to make- to give them some contracts rather than giving them a welfare handout which is what some people are proposing, to shore up democracy in that country. Let's give them the dignity of participating in an activity in which they can contribute."[242] Daniel Goldin's testimony to the same hearing did not mention democratization as a policy goal. An Office of Technology Assessment study claimed that the invitation to Russia and the subsequent transfer of funds was seen a "an important signal of US support for Russia's transition to a market economy," but NASA itself did not promote this possible argument.[243] In the post Cold War period, NASA promotional literature stressed the value of cooperation for peace, understanding, and arms control, but politely perhaps refrained from making the SSP an explicit means to democratize and stabilize Russia.

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[241] James Sensenbrenner, "Keynote Address, 34th Goddard Memorial Symposium, American Astronomical Society," (Washington: NASA Historical Collection, 1996), 1.
[242] US Congress, *United States-Russian Cooperation in the Space Station Program: Parts 1 and 2*, 24.
[243] Office of Technology Assessment, *U.S.-Russian Cooperation in Space* (Washington: U.S. Government Printing Office, 1995), 2.

Commentary and Discussion

As the Cold War eased and economics became a greater public concern, economic and technological competition entered center stage. In the 1980s new actors began to challenge the U.S. dominance in commercial launch services. Competition in space was transformed from a military and political matter to an economic issue, reinforced by existing claims about technology as an economic stimulus. Technology as economic stimulus became an important part of the ideology of space; not only would space ensure the long-term future of Humanity, but also the short-term economic power of the United States. Technology and economic growth are important for both domestic welfare and international influence. Economic potential is linked in space policy discourse through claims space-faring states will gain "profit, productivity, prestige, and national strength."[244] A NASA publication promoting the Space Station's commercial potential argued "as other nations cast an eye toward commercialization of the vast potential of space, U.S. companies must take care not to be left behind."[245] Despite calls for free world solidarity, threats to US technological leadership were seen as potentially coming from any state, friend or foe.

Therefore, foreign policy arguments, like many of the domestic policy arguments discussed in Chapter 6 are rooted in a conception of space as an

[244] Franklin D. Martin and Terence T. Finn, *Space Station: Leadership For the Future* (Washington: NASA, 1987), 8.
[245] Leonard David, *Space Station Freedom: A Foothold on the Future* (Washington: NASA, 1988), 15.

arena of competition. National power, glory, and prosperity were dependent upon a vigorous and ambitious space program anchored in the Space Station. The question of how these assumptions and ideas can be systematically applied to the study of world politics remains to be answered. Simply a vague awareness that foreign policy is important to the space program is not enough. The next chapter shall integrate this new information and formulate a new understanding of the interaction between foreign and domestic politics in a wider sense.

CHAPTER EIGHT

BRIDGING FOREIGN POLICY AND DOMESTIC POLITICS

> The goals are to assure a national competence and eminence in space that will contribute significantly to our nation's ability to define and control its own destiny, preclude preemption of future uses and opportunities by others, and support the attainment of other national goals.
>
> NASA space station planning document (1969)[1]

Integration: Bridging Policy Worlds

Politics is an eternal and universal phenomenon that is inherent in all aspect of life: the personal, the social, and the global. To better grasp political realities, events must be separated into categories or types, much as this study has categorized the arguments made on behalf of the Space Station Project. Sundering political life into separate categories may make the analyst's job easier but carries with it the danger that connections between categories will be lost or be given less attention than they are due. Because of this, it is vital to bridge category boundaries and show the interconnections between different levels or types of political activity. The task of this present chapter is to establish the interconnection between these policy fields.

Traditionally, IR scholars have tended to bifurcate political reality into foreign and domestic, the former the focus of study, the later an occasional source of demands or ideas. This of course, can have analytical value, but a more holistic approach is sometimes necessary. It has been a particular concern of this study to bridge foreign and domestic policy-making worlds and illustrate their interaction. This traditional separation creates many intellectual barriers that are otherwise difficult to cross, thus allowing important relationships to be ignored. We have seen that arguments used to promote the SSP lies along the foreign-domestic "frontier."[2] This study has have highlighted the shift from Cold War to post Cold War types of arguments as both a factor of American domestic politics and foreign policy.

In Chapters 6 and 7, foreign and domestic policy were treated as distinct. That distinction, useful for analytic clarity, must now be bridged. In particular, it must be recognized that domestic arguments that stress national power and competitiveness are in essence, foreign policy arguments. This is the most basic type of policy bridge. However, assumptions about the nature of the world and promotion of American national interests are inherent in many "domestic" policies. National power may be produced domestically, but its expression is in the wider world. Domestic policies administratively remote from foreign and military policy may still be associated with national power. In the discourse we have examined, space links science and technology with power, and the SSP is the epitome of this phenomenon.

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[1] NASA, *Statement of Work: Space Station Program Definition (Phase B). Fifth Consolidated Draft*, (Washington: NASA Historical Collection, 1969), 1-2.
[2] James Rosenau, *Along the Domestic-Foreign Frontier: Exploring Governance in a Turbulent World*, (Cambridge (England): Cambridge University Press, 1997).

The US space program is a bridging issue-area and has been from the beginning. From the data presented in Chapters 6 and 7, we can see that the arguments used to promote the SSP share the political rationale Vernon Van Dyke identified in 1968: the quest for national power, prosperity, and pride.[3] The SSP, as a specific subset of space policy, has multiple appeals that are made to separate clientele. Domestic policy arguments promise economic growth, social development, the advancement of S&T, and national pride. Foreign policy arguments suggest direct enhancement of national interests (such as alliance ties, prestige abroad) and indirectly, a greater ability to achieve America's will abroad.

Two considerations shape the theoretical ideas that follow. First, US foreign policy interests influenced the domestic development of the SSP. The most obvious change was the incorporation of Russia into the project. Extrapolating outward from this case, we can see that foreign-domestic policy interaction can be viewed using domestic politics as a dependent variable. Using this perspective, foreign policy is the source of change. This way we can recognize that domestic policies are constrained and shaped by the international environment, other actors, alliance commitments, and other foreign policy interests. Foreign policy can define or limit a state's domestic choices. Therefore, the institutional divide between foreign and domestic policy-

[3] Vernon van Dyke, *Pride and Power: The Rationale of the Space Program* (Urbana (Illinois): University of Illinois Press, 1964).

making is not fixed; institutions may be required to operate in either policy world.

Second, the intellectual and rhetorical boundaries between foreign and domestic policy-making are no more concrete than institutional responsibilities. The language used in the defense of the SSP drew liberally from the canon of national security, even when addressing matters of a wholly domestic nature. In this case, the concept of security was expanded to include economic and job security. More generally, we can see that a domestic policy can be framed using the language and interests of a state's foreign policy. Actions or power configurations outside a country are relevant in that they may be seen as threats or opportunities. Domestic actors can used these factors to promote or block policies. It is important to recognize that foreign and domestic politics are not separate and distinct but parts of the same institutional matrix of actors, processes, and rules of action. The SSP provides ample evidence that a policy can easily fit into both worlds simultaneously, bridging elites, policy language, and institutions.

The influence of domestic politics on foreign policy-making is acknowledged by some scholars. Cultural, economic, and political factors are understood to be components of foreign policy decision-making. In contrast, the influence of foreign affairs on domestic politics is less well understood; the *use* of foreign policy to *influence* domestic politics has not been fully examined by IR scholars.

This chapter probes the relationship between foreign policy and non-foreign policy arguments. Each policy world is hazily bounded and policies relating to space exploration fall into both policy worlds. This chapter shall demonstrate that arguments promising benefits to the domestic economy and society are logically linked to the cause of foreign policy. Finally, it shall take the lessons learned from the SSP and construct a general model of how foreign policy influences domestic policy-making.

The discussion that follows develops a framework to better understand this interaction and especially the way that foreign policy acts as a source of influence. Three new theoretical understandings are offered. First, while essentially sound, Putnam's Two-Level Game needs to be expanded to incorporate more complex policy-making environments. Second, this chapter systematizes the concept of the bridging issue and offers six possible foreign-domestic policy interactions. Third, new analytical terms are suggested to improve understanding of the influence of foreign policy on domestic politics.

N-Level Game: The Negotiations

US-Partner Negotiations

When the SSP is viewed as a totality, it is clear that it lies at the crossroads of foreign and domestic policy action. In the first instance, the SSP is a domestic policy of the United States. Its administrative authority, NASA, is regarded primarily as a domestic civilian agency. The major benefits and goods to be produced by the Station are domestic, in the sense that they are presented as benefiting the domestic economy and the public at large through the promotion of domestic social goals.

Simultaneously, the SSP is a foreign policy program of the United States. It has involved international negotiations, formal written agreements, and close consultations with the American foreign policy/national security establishment. The involvement of 15 other countries makes the SSP at least in part, a foreign policy matter. The fact that one of those 15 countries is Russia makes it a foreign policy program of high order, embodying national security and foreign policy grand strategy. It was this duality that facilitated the interactions: the foreign policy environment became a source of information and images that were used domestically. NASA officials, and their supporters in Congress and the Executive, used US foreign policy interests and concerns to defend the Space Station within the domestic political environment.

Taking into account these factors, it is best to view the Space Station as an inter-mestic program, transcending the domains of domestic and international politics and sharing elements of both. Inter-mestic policies are characterized by a dual institutional nature. They are the concern of both foreign and domestic policy institutions and are issues of both inter-governmental and intra-governmental policy negotiations. In addition, inter-mestic policies usually cross national boundaries. Therefore, the SSP (and other bridging issues) are rhetorically and institutionally in both worlds.

A major contribution to our understanding of this phenomenon is Robert Putnam's "Two Level Game" (1989) model. Putnam illustrates the domestic level of foreign policy-making and the interaction between the levels of negotiations. His model is very useful for understanding the overlap between different layers of politics. However, the bridging model offered here, suggests that the two levels described by Putnam may be further differentiated and that foreign policy and domestic policy are intrinsically linked. The SSP experience suggests that the Two-Level Game model would best be recast as the N-Level game.

The number of actors involved was manifold.[4] Domestic policy actors were involved in making "foreign policy" during the development of the SSP and the international negotiations between the US government (NASA and other agencies) and its partners. As shown in Chapter 5, the SSP, as a "foreign policy" act, involved several government agencies, corporations, and other actors. Each actor consisted of various sub-actors with independent interests. Coordination between the actors was and is essential for the success of the SSP. Therefore, the negotiators while seeking to maximize their own states' interests, also needed to ensure the overall success of the project and a "win-win situation."[5]

The interactions between the United States and its partners were not monolithic. Interactions and negotiations occurred at three levels: 1) foreign policy (national) agency level, 2) space agency level, and 3) working group level. These different levels are distinguished in that different sub-national actors chaired different level meetings. For high-level decisions regarding legal jurisdiction and commitments, the US State Department represented the United States. At the second level, which dealt with technical issues of design, utilization, and access, NASA was the lead agency. Working group negotiations worked out the details of various activities and handled by smaller groups drawn largely from NASA, though other agencies were also involved.[6]

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[4] As the concern of this study is policy-making in the United States, that is where our focus shall be. However, it is useful to note that the international partners were not a monolith, either collectively or individually.

[5] Herman Pollack, "International Relations in Space: A US View," *Space Policy* (February 1988), 26.

[6] Lynn Cline, Interview With Author, 9 July 1999.

There were also several separate rounds of talks. Initial negotiations held between 1984 and 1988 produced agreements between the US and the original partners (ESA, Japan, and Canada). These talks produced the 1985 and 1988 agreements that governed the design, construction, and use of the SSP. The US held the greatest share of power during these negotiations. The 1994 incorporation of Russia necessitated a new negotiations and agreements. The US and the original partners at first sought to incorporate Russia into the existing agreement structure. However, the contributions that Russia was expected to make were far larger than any country, except the US. Russia also had greater autonomy in space than any of the original partners. Therefore, a new IGA and new MOUs had to be drafted.

These latter negotiations were conducted in stages and not as a general meeting of all the partners. Although initiated by the US, the formal decision to invite Russia into the program was itself the result of months of negotiations with the partners. Once that decision was made, negotiations for new agreements were held between 1994 and 1998. This was also a multi-step process. The US and the original partners developed a joint position that was then presented to Russia. Russia and the US then negotiated a compromise position, which Canada, ESA, and Japan then had to approve before it could be formally adopted.[7]

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[7] Lynn Cline, Interview With Author, 9 July 1999.

There were demands from the international partners that were both material and symbolic. Material demands were focused on cost, as any changes the US made the overall design or scheduling of the SSP potentially would cost the partners money. The original partners experienced several cost increases due to unilateral American action and rightly concluded that containing their costs were not a high priority for NASA. Essentially, the partners sought minimum design changes, maximum technology interface, and guarantees of program stability. The partners were also alert to how any proposed changes to the Station would affect their utilization and access.

The partners were also attuned to the symbolic nature of the SSP. The Europeans, who by 1994 had more experience in space than in previous ventures with NASA, was most concerned that the partners we regarded as *equals*. This was not equality in action or managerial control, as NASA was providing the bulk of the SSP hardware and flight services. The partners did seek regularized consultation and reassurances that they were full partners in the SSP enterprise. The inclusion of Russia heightened this concern, as the partners feared that they would be relegated to a minor role in what was now largely a US-Russian project. The partners' primary concern in these negotiations was the preservation of their rights secured under the 1985 and

1988 agreements.[8] The vulnerability of the partners was not theoretical. One proposal considered by Clinton in 1993 was a "minimal station" that implied the contributions of the original partners could be delayed or forgone. This proposal was not adopted, in part due to the objections of the partners. However, the initial talks that brought Russia into the SSP in 1993-4 were bi-lateral in nature and presented to ESA, Japan, and Canada almost as a *fait accompli*.[9] The original partners did have reason to remain vigilant.

The theoretical significance of these events is that actors in an N-Level Games may not have the same degree of power, influence, or concern over outcomes. While important, negotiations with the original partners (with the partial exception of Canada) were not essential to the success of the SSP or the political credibility of the project supporters. NASA would have preferred to have the original partners and would have suffered if they withdrew, but could still continue; the original partners gained nothing from failure to reach an agreement. Even prior to 1993, the original partners had far less ability to influence US behavior by threatening not to ratify. The United States and NASA had a great deal of latitude for unilateral actions (like the Langley redesign and the invitation to Russia). This power was limited, partly by a real desire to have international partners as well as a wish not to spark any political conflicts with

[8] Graham Gibbs, *Expanding the International Space Station Program Partnership: An International Partner's Perspective* (Paris (France): International Astronautical Federation, 1994), 7.
[9] Gibbs 1994, 6.

the partners. However, these were more a function of US domestic political conditions: the desire for "cost saving" measures and NASA's "international tradition." Limits on the US were largely a factor of self-restraint rather than result of the partners' influence. The US side of the Game, at both levels was far stronger than the original partners, singly or collectively.

The Domestic Negotiations

The domestic level negotiations were also a very complex environment. NASA had to accommodate multiple interests in the negotiations. There were several crosscutting demands. NASA cultivated President Reagan and his successors, for the agency needed to maintain White House support or the project was doomed.[10] However, the White House was not a monolithic entity but a cluster of actors. The three Presidents that oversaw the SSP between 1984 and 1998 (Reagan, Bush, and Clinton) all gave verbal support to the project, but faced opposition from within their own Administrations. Reagan's Science Advisor Keyworthy and Budget Director David Stockman both urged Reagan not to start a space station. The Department of Defense, while insisting upon a right to use the Station was unsupportive and even hostile to the SSP. While open opposition to the SSP faded when Reagan formally announced the

[10] An unsigned NASA document is one example of the internal strategy the agency pursued. Ronald Reagan was most important, because he was "truly supportive" (NASA, *A Political Strategy for Space Station* (Washington: NASA Historical Collection, 1986), No Pg. The

project's start, these different agencies continued to pursue independent courses, offering lukewarm support or subtle opposition to SSP expenditures or operations. This pattern continued into later administrations. Bill Clinton, pursuing a different domestic agenda, had the option to cancel the SSP and some within his Administration supported that course. The three presidents needed overcome opposition within their administrations that sought to undermine their decision to support the SSP. This was not a single ratification or decision point in time but a series of points that involved many different collective and individual actors.

The other major internal negotiation was with Congress. The legislative branch was also sharply divided into pro- and anti-Station positions, although these positions were amorphous and shifting. Certain members of Congress, space committee members and staffers, were the most important actors. Annual budgetary hearings were the major forum for negotiations between NASA and Congress. On certain occasions the agency needed to respond to specific demands from that conflicted with the demands of the partners. The focus of members of Congress was domestic and local; the interests of the partners (and other Congressional constituencies) were secondary.

The domestic negotiations were multi-layered and continued over several years. There was never a point prior to 1998 (when the first Space

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leadership of both Houses of Congress and leaders of both parties were listed as priority contacts.

Station components were launched) that Reagan's 1984 could not have been changed by domestic political action, despite international agreements and ratification by the other 15 countries. In this case, the commitments were not firm enough and the penalty for defection was too minor for the domestic opponents to resist the decision, although they were unsuccessful.

These domestic level challenges had an impact on the international level. The greatest difficulty faced by the international negotiators, especially NASA, was the uncertainty about the exact status of the Station project. Funding was never certain from year to year, so it was not clear exactly what the Space Station would look like or what it could do, especially prior to 1995. Changes mandated by Congress or presidents made it difficult to be certain what would be possible. During the negotiations that preceded the 1988 agreements a European official commented to *Aviation Week*, "In the Station's case, the President opened it when NASA was still in Phase A... NASA has been trying to negotiate international cooperation, but on the other hand, the agency is not 100% certain what it has to negotiate with."[11] There were constant negotiations and decisions made at each level. Even as NASA negotiated with the partners, it waged a series of rear-guard actions with Congress, the DoD, and White House to ensure a continuation of the project.

[11] Craig Couvault, "US, Europe Deadlocked Over Station Participation," *Aviation Week and Space Technology* (24 November 1986), 17.

The SSP indicates the sheer complexity of the negotiations and how they did not occur at limited points in time but across the entire historical period and within the foreign-domestic Levels described by Putnam. These negotiations are important because they reveal the multiple levels to the process. The Two Level Game is only part of the process in the SSP negotiations. The number of interactions between and within the various state actors suggests that it is more appropriate to refer to a N-Level Game. In highly complex negotiations there may be several sub-levels and multiple points at which a level is involved in ratifying an agreement. The Two Levels conceived by Putnam do not have to be bounded distinctly in time; they may also be differentiated into multiple sub-levels.

Interactions Between Foreign Policy and Domestic Politics

The second major contribution of this research is a new way to envision the interaction between foreign and domestic politics. Moving from the specific case of the SSP to more general understandings of the foreign-domestic policy matrix requires that we accept that these two policy realms are loosely constructed and overlap to a large degree. Foreign policy does not exist in splendid isolation from domestic politics. However, the interaction between foreign and domestic policies poses an additional theoretical dynamic: domestic policy can be influenced by foreign policy interests and ideas as critically as foreign policy may be influenced by domestic politics. Foreign policy is a major influence on domestic politics and policies, especially when the international environment is exerting pressure on a state. The use of comparisons or analogies bridge foreign and domestic worlds, as events external to a state may be drawn into a domestic policy deliberation. External events and actors are used as sources of information, examples, or as cases, domestically. Foreign threats can be adopted as internal threats, especially if there is an identifiable domestic group (leftists during the McCarthy era, Arab-Americans after the World Trade Center bombing) that can be linked to the outside entity. Bridging issue areas can be done for rhetorical purposes to influence the course of policy in either domain.

Spanning the divide between foreign and domestic policy issues are a variety of bridging issues such as space policy, which embody elements of both domains and act as a link between them. Bridging issues have several characteristics. First they contain conceptual elements occurring in both foreign and domestic policy-making worlds and are relevant to both. However, it is not necessary that concepts be used in an identical fashion. Indeed, a concept will often be transformed in the process of application from one realm to another. For example, competitiveness is a concept that is used in both policy worlds, though with a different emphasis. Domestic policy decision-makers refer to competitiveness as an economic good that enables prosperity. Foreign policy decision-makers view competitiveness as an adjunct to military power and the source of international economic influence. A policy proscription offered by both policy decision-making elites could be increased military spending to stimulate technological innovation and improve the competitiveness of a particular industry. Thus, a bridging issue concept may have different meanings in different environments, although similar policy proscriptions may be offered.

Second, bridging issues serve as a conduit between policy worlds that allows for ideas (conceptions of the world), information (truth-claims), and language (terminology, metaphors) to pass from one to another. An obvious transference of ideas that has occurred is the application of human/civil rights values originating in the domestic politics of Western democracies to the global level. In the other direction, the concept of security has been applied in domestic settings and used to promote personal and economic safety.

The metaphor of the bridge is useful because it allows analysts to recognize that politics are not bound in discrete units. Foreign and domestic politics and policy are clearly united in many ways and this study does not wish to suggest that this inter-relationship has never been recognized. All foreign policy issues are in a sense bridging issues; major decisions are made by the same elites that decide domestic policy. Foreign and domestic politics are united by the nature of politics: coalition building. Cross cutting demands exist within any political system and leaders must accommodate multiple, often conflicting, interests. The process of coalition building has within it an incentive to bridge, link, or bundle issues together. Foreign and domestic decision-making both exist within the same budgetary environment. The two policy realms will affect the other, as it is normal for trade-offs to be made between different priorities. National culture, political institutions, and experiences are all inputs into a state's foreign policy. Many domestic policy issues are bridging, all have the potential to be bridging through analogies or comparison with other countries.

Foreign Policy as a Policy Frame

Bridging foreign and domestic politics suggests six relationships, three of which employ foreign policy as a policy frame and three a domestic frame. The following section shall take evidence from the SSP case discussed in previous chapters and use it to develop a general model of foreign-domestic policy interaction.

Foreign Policy as a Component of Domestic Policy

The first relationship views foreign policy as a full component of domestic political deliberation. In this conception, the foreign policy interests of a state

Table 8.1: Foreign Policy as a Factor in Domestic Policy

General principle	Definition	Example From SSP
Foreign Policy as a Component of Domestic Policy	A Foreign policy or external interest cited in relation to a domestic policy or issue. *"Foreign Policy Issue A is relevant to Domestic Policy Issue B"*	"[The Space Station] is a symbol of our desire and our ability to work together with our friends and allies on a civil program for peaceful purposes" James Fletcher (1988) James Fletcher, "Letter From James Fletcher to Patrick Leahy," (Washington: NASA Historical Collection, 1988).
Foreign Policy as Justification for Domestic Policy	Event external to the state cited as a reason to do something domestically *"Foreign Policy Issue A requires Domestic Policy Act B"*	"This is a very important foreign policy initiative. It represents a profound change in our relationship with Russia, both in space and on Earth. We're learning to trust one another, to work together, to bring our talents together for all our children." Dan Goldin (1995) Daniel Goldin, "Who's Worrying About the Children? NASA's and America's Technological Future, Remarks at the National Press Club," (Washington: NASA Historical Collection, 1994), 2.
Foreign Policy as Constraint on Domestic Policy	Foreign policy limits domestic action *"Foreign Policy Act A means that we must do Domestic Policy Act B"*	"We will have to renege on our agreements with our international partners... Our friends and allies have already spent $1 billion on preliminary studies, and plan to spend a total of $8 billion more as their share of station costs. Pulling the rug out from under them at this stage would cause chaos in their respective space programs and further repercussions that will affect America's international relationship as a reliable partner." James Fletcher (1988) James Fletcher, "Excerpts From Remarks Prepared For Delivery: NASA Press Briefing; Kennedy Space Center, Florida," (Washington: NASA Historical Collection, 1988).

are important factors in domestic politics and policy. Any country's foreign policy will reflect the interests or concerns of the domestic elite, the national political culture and the country's self image. Especially when a state is experiencing external stress, its foreign policy may become a component of one or more domestic policy issues. In such cases, foreign policy act X is linked to domestic policy Y. However, this goes beyond merely linking two issues. Specific domestic actions are justified, driven, or planned based on presumed and specified external interests.

Foreign policy and national security ("high politics") arguments can be consciously employed or manipulated by domestic political actors as a strategy to support a desired end. Because national security holds such high political value, converting issues into national security language can heighten their importance. National security is regarded as the highest value of the state, and arguments employing such phraseology are more difficult to attack. Elites may employ foreign policy as a reason to act domestically, as when NASA stressed the scale and scope of Soviet space station activities in the early 1980s. Such arguments may include calls to strengthen some perceived element of national power, the necessity of keeping commitments to allies, and the importance of projecting a positive image to the rest of the world. These arguments may be used to generate domestic support for a specific policy or to increase the legitimacy of a policy act or program by linking it to the high politics of diplomacy and security.

In the case of the SSP, there were constant overlaps between national (military and economic) security and space. The linkage was not always overt but relied on assumptions about American leadership in space and the overall strength of the nation's economy and society. Cooperation with Russia was another foreign policy act that was a component of the domestic space program: the relationship with Russia was presented as a means to pursue an originally domestic project. The SSP began as a domestic endeavor with foreign policy overtones, linked to Cold War competition and US foreign policy interests can be seen in many of the arguments presented in favor of the SSP. As time progressed, the Cold War ended, and US interests shifted, the SSP was transformed into a full foreign policy project in all but name. The domestic elements of the program remained intact but the political *raison d'être* of the SSP became cooperation with Russia. In 1993, the SSP became part of a general strategic plan towards Russia: engagement and close cooperation.[12]

Foreign Policy as Justification

In cases when foreign policy is not merged into domestic politics, there are still close associations between the two policy realms. Foreign policy may

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[12] William Clinton, "Letter from Bill Clinton to James Sensenbrenner, 22 June 1994" (Washington: NASA Historical Collection, 1994).

be given as an explicit reason to act domestically. A domestic action is promoted or supported by reference to a foreign policy or national security interest. Foreign policy can be cited as a reason to act domestically. An external "threat" may be used to galvanize support for a particular policy action. The appeal to events outside the country may be a rallying cry for domestic action. This is includes military threats (real, perceived, and alleged). It also includes foreign analogies and case studies. This transposes the situation in a foreign country and compares it to a less satisfactory situation in the actor's country. The appeal is to both material and psychological interests. Because national security holds such high political value, converting issues into national security language can heighten their importance.

Comparison to other countries shows what is possible but also suggests that the actor's country is in a weaker (negative, shameful) position vis-à-vis other states. If those comparison states are framed as hostile or enemy states, the comparison has an additional military/security dimension. Comparison may be done across time as well as geography. Historical analogies provide examples and warnings that are applied to the contemporary situation, showing the consequences for countries that acted or failed to act.

In the case of the SSP, two very different foreign "threats" were very useful in formulating arguments. The first was the Soviet advances in space stations, creating an apparently permanent Soviet space infrastructure.

Allusions to and images of this "threat" were repeated in publications, speeches, and the November 1983 presentation to Ronald Reagan. NASA officials recognized the value of the "space race" idea, which had served the Agency so well in the past: "The point cannot be made to (sic) strongly that we must highlight the fact that the Soviets already have a space station in orbit and, as part of an aggressive space program, are planning to expand the capability represented by Salyut."[13]

This foreign policy rationale of the Space Station is one of the key defining elements of the project. When the SSP began in the early 1980s, the primary political justification was competition with the Soviet Union and cohesion of the "Free World" alliance. The existence of the USSR as an adversary state was central to the presentation of the SSP. The Soviet space program, at the time the other player in space, was a fact that SSP advocates could cite. The Soviet program was described in sinister terms as a political and or military threat. The climate of the period (1980-91) made such appeals a viable political strategy. Even when not mentioned, the Soviet Union was the "other" in world politics against which American ideas of freedom was measured. The Soviet Union also was a material rival that required a competitive stance in many fields, including S&T. The presence of Soviet space stations became a reason for the US to build a space station of its own.

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[13] Terence Finn, "Note to Culbertson," (Washington: NASA Historical Collection, 1981), p. J.

Demonstrating American "greatness" or "power," was part of the Cold War struggle for world influence.

The Cold War justification was no longer viable in the post 1991 period and SSP advocates needed to retool to adapt the program for the new era. The new threat facing the US was political chaos, especially in Russia. In place of the Cold War-competition model, advocates embraced the erstwhile foe and began to emphasize the cooperative nature of the SSP. As the relationship between the superpowers warmed, greater cooperation was foreseen, culminating in the integration of Russia into the SSP. Stabilizing Russia and the superpower relationship became the new foreign policy justification for the SSP.

Foreign Policy as Constraint

Foreign policy may have a constraining, as well as enabling, effect. One form of constraint is institutional (legal, normative, or structural). A state's domestic politics and regime type may be constrained by the presence of a regional power, such as Soviet dominance of Eastern Europe. Domestic economic policies may be dictated by external actors such as the International Monetary Fund or by leading economic powers. Constraints may be the result of structural divisions of authority within a state (such as legislative and executive). They may be the result of changing political interests (or new problems that are identified), conflicting interests, or even voluntary constraints accepted by a state.

The SSP, as a domestic policy act was constrained by several foreign policy interests, commitments, and actions. The most important constraint made abandonment of the project difficult. Cancellation of the SSP threatened a penalty in reputation and potential retaliation in other areas of cooperation. If the US were to cancel the SSP, it would produce financial costs to its partners. Unilateral US action would be extremely unfair to those partners that had contributed time and money to the project. The result would be a tarnished reputation that would harm American ability to reach cooperative agreements in the future. Breaking the nation's promise would also have material consequences for future cooperation, creating the specter of bad relations with allies. This appeal also had a moral dimension: it would be “unfair” or “wrong” to abandon partners who had been true to their commitments. Finally, there was a threat warning, in the form of jilted allies “going it alone” or joining the Soviet Union as an alternative to an unreliable United States.

Another side to the concept of institutional restraint is those limitations that an actor willingly accepts in order to achieve a higher goal. States do willingly limit their ability to act as a means to higher values. Germany legitimizing power politics through common institutions (the EU and NATO) and

Italy using EMU commitments as means to fiscal control are two such examples.

The SSP placed limitations on American domestic and foreign policy action. The participation of the partners created a political environment that limited the ability of the US military to use the Station. This participation did not forbid military participation in the project, but would have limited what the Pentagon could do. It also created the appearance of restraint that helped "alley Congressional fears" of a militarized space program.[14]

Another form of constraint is the development of new foreign policy concerns that impacts domestic policy. Foreign policy may undermine a domestic policy. One of the major rationales for incorporating Russia into the SSP was to enhance proliferation controls. However, it has never been fully established that Russia transfer of military technology entirely halted, despite this arrangement. In March of 2000, Bill Clinton signed into law a law that closely linked Russian nonproliferation of nuclear, chemical and biological weapon technology to Iran, with "extraordinary" funding of the SSP.[15] This law limited NASA's freedom of action in regards to Russia. Tying the SSP to a difficult policy area (non-proliferation) made it hostage to changes or problems

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[14] Kenneth Pedersen, "Memorandum From Kenneth S. Pedersen to John Hodge, Strategy For International Cooperation in Space Station Planning," In *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program. Vol. II: External Relations*, John Logsdon, ed. (Washington: NASA, 1982), 97.
[15] "Moscow Criticizes U.S. Law Linking Space Money, Iran Ties," CNN [On-Line Version], 15 March 2000, 1. http://www.cnn.com.

emerging in that area. Therefore, domestic action may be undermined as a result of bridging it to certain foreign policies.

Domestic Policy as Policy Frame

Domestic Policy as a Component of Foreign Policy

The first relationship that views foreign policy through the frame of domestic politics represents the reverse of the first foreign policy frame. Here, a domestic policy action is defined as being wholly a part foreign policy or national interests. The interests and concerns of a state's foreign policy are identified as benefiting from a specific domestic policy action or decision. There is a close association between the two policy areas and they are essentially merged in rhetoric and closely bound in reality. Associating a domestic policy to foreign policy or national security raises the status of the domestic issue to "high politics," making them a matter of national interest.

There are several domestic policies that have a clear connection to foreign policy. In general terms, macro-economic conditions serve as an important adjunct to national power and influence. Economic factors have long been recognized as elements of national power. This includes global competitiveness in trade relations. This may be in relation to political-military allies, neutrals, or adversaries. National interest would also include self-

Table 8.2: Domestic Policy as a Factor in Foreign Policy

General principle	Definition	Example From SSP
Domestic Policy as a Component of Foreign Policy	A domestic policy is defined as a foreign policy or national security issue *"Domestic Policy Issue A is relevant for Foreign Policy Issue/Act B"*	"We must not let the same thing happen in our business that has happened to many other American industries. We must also understand how to turn the technological leadership in space that we now enjoy to the advantage of the United States" Hans Mark (1983) Hans Mark, "[Speech to] American Institute of Aeronautics and Astronautics," (Washington: NASA Historical Collection, 1983).
Domestic Policy as Projection into the International Environment	A domestic action is taken to enhance a state's foreign reputation. *"Domestic Policy Act A will our image internationally."*	"It is important that we continue to recognize that achievements in space operations are, for better or worse, a measure of national prestige- and more important- a measure of *national competence* by many people around the world." Hans Mark (1983) Mark, "[Speech to] American Institute of Aeronautics and Astronautics." (Washington: NASA Historical Collection, 1983).
Domestic Policy as Constraint on Foreign Policy	Domestic policy or legal framework limits actions internationally *"Domestic Policy Act A means that we must do Foreign Policy Act B"*	"We have turned over technology under the name of free enterprise to Japanese... I think we've just got to be careful that it doesn't- in the name of international goodwill- that it doesn't turn around and come back and slap us in the face." Bill Nelson (1983) US Congress, House of Representatives, Committee on Science, Space, and Technology, *NASA's Space Station Activities* (Washington: Government Printing Office, 1983).

sufficiency in resources (including natural resources) and the development and production of key high technology goods. In general economic terms, key resources (whether defined as strategic military or economic) are important for a states overall welfare. Economic strength, employment, and growth are components of international power, as they contribute to military strength and give states the resources (monetary, military, and technological) necessary to promote their political interests.

Domestic factors beyond the economy also may be incorporated into foreign policy. Subtler are the indirect connections made between domestic events and international politics. It is possible to construct bridges between highly divergent issues, such as education and national security, as seen in the NDEA.[16] Education is the underpinning of S&T. Therefore, a modern military requires technically competent and literate troops and the military inventory requires the sophisticated technologies that can be produced by the S&T field. As education represents a country's future, the quality and content of education can be associated with broader political concerns, including military strength.

Domestic factors, including the economy, were central to the political justification of the SSP. The general society was to benefit from the project and in turn, national power would be enhanced. The most important domestic elements of the SSP linked S&T development to social and economic progress.

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[16] Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958* (Westport (Connecticut): Greenwood Press, 1981).

This promised social progress, including high tech jobs, but also increased interest in science and math education. The nation's international power would benefit from a stronger, more competitive economy and a better-educated workforce. Technological stimulation was an important theme, and technology was frequently tied to American economic and technological competitiveness. Advocates warned of competition and the critical need to "invest" in the future through the SSP. National power could only be built and maintained by conscious decisions. This association was not always military in nature. The growth to be spawned by the SSP would stimulate the overall society, enhancing America's competitiveness and economic clout.

Domestic Policy as Projection

Domestic acts are not always intended for a country's internal audiences alone. Foreign policy actions are in part a method to present one's nation to the world and to construct a national image or reputation. The establishment and development of a national image may be defined as *projection*. This process is not limited to explicit foreign policy acts, but includes the use of domestic actions or conditions to augment a foreign policy status or image. Policy acts usually seen as domestic in intent can be projections into the international arena. The obvious example is military preparations. While domestic acts in their execution, military preparations have as their external actors as their intended audience.[17]

The production and use of these images are examples of symbolic politics, but are also a means to influence and prestige. A country in pursuit of foreign policy goals may wish to appear politically united, peace loving (or militarily potent), technologically advanced, or socially progressive. Projection of a national image is can be a major element of foreign policy, where ideas and perceptions can count as highly as cold steel. States will therefore construct images of themselves for consumption abroad as well as for internal consumption.

This may be done in many possible ways. International sporting events (especially the Olympics) propagandize a state's abilities and may be used to glorify its culture or social system. This is a pattern seen in, but not limited to dictatorial states. Similarly, large public works, from the Pyramids to the Moon landing, can proclaim the prowess of a society. Great tours, such as America's "Great White Fleet" of 1907, manifest both military and societal power. An educational, social welfare or health care system that is "the envy of the world," is an additional example of this sort of demonstrative politics. Cultural exportation is another form of projection, using a state's social system to demonstrate its greatness. Publication of historical heritage and elaborate

[17] Not all military preparations are intended for external use of course, as the majority of wars in the past century have been internal.

ideologies of national glory are ways to create a national image abroad to impress, inspire fear or admiration. All of these activities have an important commonality: the publication of the greatness, ability and confidence of a country.

NASA presented the SSP as a symbol of national power and determination. The presentations NASA gave to Reagan stressed these prestige elements. The literature that promoted the SSP almost universally stressed national pride and reputation. Apollo demonstrated how space activities could be presented as proof of American capabilities; the SSP was presented a similar opportunity.[18] The SSP was promoted as a means to advance American national reputation for technology and in general. It was also a means to prove to the world that the US was a "great" country capable of doing great deeds. The image of the United States as a technological power would be enhanced by the completion of such an impressive task. As it was defined as a "peaceful," "scientific" pursuit, the Space Station presented an

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[18] Although NASA promised the Space Station would enhance American foreign policy, the State Department showed little interest in using the SSP for foreign policy purposes and only rarely lobbied Congress on its behalf. The US State Department appears uninterested in using the space program for foreign policy benefit. Officials interviewed reported little interest from the State Department in the SSP, beyond supervising the negotiations. In one exchange in a Congressional hearing, both the NASA representative Kenneth Pedersen and Senator Harrison Schmitt, bemoaned the lack of interest by the State Department in using space to promote American interests:

"Mr. PEDERSEN. As my testimony indicates senator, I believe that space and space related technology is of great interest around the world.

Senator SCHMITT. In my estimation it's obvious to everybody but the State Department." (US Congress, Senate, Committee on Commerce, Science, and Transportation, Subcommittee on Science, Technology, and Space, *NASA Authorization For Fiscal Year 1982. Part Two* (Washington: US Government Printing Office, 1982), 428.

image of a pacific America in search of knowledge for "all mankind." The SSP was clearly a means to create a specific image of the United States, and to project it into the international arena.

Domestic Policy as Constraint

The third relationship in the domestic politics frame is the constraint on foreign policy-making that emerges from the domestic political sphere. Just as foreign policy may constrain domestic action, domestic politics can limit freedom of action in foreign policy. Constraint is here defined as a domestic policy decision or interest that sets a legal or political limit on what negotiators or officials can do internationally.

Domestic policy may constrain the foreign policy options available to the negotiating agency. Domestic policy interests and ideas limited the ability of the US to accommodate its foreign allies. The fact that the international partners were also economic competitors was an occasional concern of Congress, especially in the 1980s, when rhetoric about "Fortress Europe" and "Japan Inc." was at their height. The two issues, trade and alliance cooperation, could not be separated entirely. NASA had to embody both elements in policy and rhetoric without openly calling for co-option of the partners or stressing too strongly the competitive nature of the US-allied relationship. Yet, both had to be used in publications and Congressional hearings secure the twin political rationales of cooperation and competition.

One specific case exemplified the dilemma of promising the domestic ratifier one thing while promising an external actor a seemingly contradictory option. NASA had to accommodate the demands of the partners for maximum return on their investment in the project and access to the facility while simultaneously reassuring Congress that the US would enjoy the bulk of the benefits produced by the SSP. In 1986, as a cost saving measure, NASA considered having the international partners provide more integrated components, (i.e. modules that substituted for US-produced modules). The agency soon faced with a Congressional demand that the US lab module and centrifuge be launched *before* foreign labs and that no foreign components would substitute for US elements. Representatives Edward Boland (D-MA) and Bill Green (R-NY), ranking members of the HUD-Independent Agencies Subcommittee, the panel that controls NASA appropriations, demanded that NASA not trade technology transfer over the long term for an immediate budgetary solution. In a firm sent to William Graham (Acting NASA Administrator), the pair demanded that NASA clarify its position regarding the role of the partners and insisting that the key Station elements and technology developments be the responsibility of the United States alone. The US had to be the "principal benefactor of the space station program [and] the primary role in developing the station and should derive the principal benefits." The irony of this incident is that the arguments that had been used to promote the SSP became constraints. The demand from the domestic actors limited the options available during negotiations.

The Boland-Green letter repeated the arguments presented over the preceding three years about the SSP as a source of economic and technological improvement. Congress had been told that valuable economic benefits in the form of technology would accrue to the US from the SSP. Anything that suggested the international partners would enjoy a privileged amount of those benefits was not acceptable to domestic ratifiers. The Space Station had been presented to Congress as a font of technological and economic power. While not necessarily rejecting international participation, the Boland-Green letter mirrored the NASA line that the SSP would produce advanced technology. That technology therefore had to be produced primarily by the US: "NASA could be tempted to make compromises with potential foreign participants in order to make financial benefit that may have a negative long-range impact on U.S. high technology development. Therefore, we believe it is important that NASA insure that the U.S. be the dominant developer, outfitter, and user of the space station."[19]

[19] Edward P. Boland, and Bill Green, "Letter From Edward P. Boland and Bill Green to William R. Graham," (Washington: NASA Historical Collection, 1986), 3.

New Policy Concepts

Internationalization as a Strategy

These relationships suggest several new methods of conceptualizing the foreign-domestic policy interface. The interaction between these policy worlds is complex, but three types of policy bridges can be envisioned. Two are evident in the SSP case while the third is not.

The first is “internationalization” of a domestic policy. The SSP represented a special kind of policy interaction: the conscious merging of foreign and domestic policies by inviting foreign participation in a domestic policy or project. As the SSP case suggests, the associations described in the foreign-domestic policy relationships can be consciously employed by policy actors to enhance the prospects of political support. Internationalizing a project involves the creation of cross-broader partnerships or agreements for joint action. Domestic policies or programs may be directly linked (or held hostage) to a state's foreign policy by merging them with the activities of other states. This process creates a hybrid inter-mestic policy that is domestic but dependent on foreign policy.

Domestic policies and projects may be internationalized in part, or in whole. Internationalization may range from informal declarations, such as joint statements endorsing common economic or social policies, to formal treaty-based cooperative arrangements. Internationalization involves some connection between the domestic activities of separate states, with the expectation that the end result is a common program, product, or policy outcome that each state desires. Internationalized activities may be linked to alliances such as the frequent references to *Freedom* as a "Free World" space station. Alternatively, activities may be restricted to more general, symbolic cooperation.

Although internationalization can cause additional management and budgetary problems, it represents a valuable strategy for weak programs for several reasons. First, internationalization creates the prospect (though not necessarily the reality) of lower costs per state. An internationalized policy can be presented as being cheaper than solo efforts as a share of the expenses are borne by other actors. The international partners provided a safety valve for the SSP in the form of funding. Their contributions made the total cost more palatable for US decision-makers.

A second advantage to this approach is an increased number of potential lobbyists supporting a project. As noted above, many space projects have been international ventures and several have involved close cooperation at the development stage, such as *Spacelab*. NASA has internationalized space projects by bringing in international partners as this increases the potential number supporters and lobbyists promoting a project.[20] Splitting costs

[20] Marcia Smith, Interview With Author, 10 June 1998.

also broadens the cost of cancellation and increased the number of actors involved. International partners also have lobbied on behalf of threatened joint projects. In one case, the US State Department lobbied for the maintenance of the *Galileo* probe at the request of West Germany, which had invested heavily in the project.[21] Representatives of the partners testified before Congressional committees on several occasions. In other instances they transmitted letters to executive branch officials via State to express views of domestic policy actions. With the SSP enshrined in international agreements, its cancellation became politically more costly. NASA was successfully able to apply the support of the partners when the Station was in danger of cancellation in 1991.

Internationalization also allows policy-makers to link a state's actions to its reputation or "word." This creates moral pressure not to act contrary to commitments. Finally, internationalized domestic policies can be entrenched by expanding their scale and legal commitments. It is more difficult to cancel a project that has international commitments without harming relations with those states. When a project is internationalized, cancellation is more difficult as it then requires a violation of written agreements with other states. A desire not "break the nation's word," becomes an additional argument in favor of a particular course of action.[22] It was an explicit NASA strategy to emphasize to lawmakers that in committing to the SSP, the US was in essence giving its

[21] W.D. Kay, *Can Democracies Fly in Space? The Challenges of Revitalizing the US Space Program* (Westport (Connecticut): Praeger, 1995).

word to the other partners. By linking national reputation to the SSP, NASA was able to construct an argument that the US could loose the trust of its allies should the project be canceled. Such a loss of trust would make any future joint endeavors more difficult. It was a threat to the SSP itself. While the partners enjoyed no formal veto over unilateral US actions, political pressure did exist and the partners did enjoy the ultimate sanction of withdrawing from the program. Such withdrawal would not have necessarily threatened the physical existence of the project and would have posed few additional costs. It would have had serious political consequences and undermined the domestic political momentum of the project.

International participation can also broaden a policy or project's political appeal. The claim that the Station was "international" also lent it a greater legitimacy for certain key members of Congress, especially liberal Democrats, like George Brown. The advantages of internationalization therefore include an expanded base of support for a policy or program. Adding additional governments can increase the lobbying potential to support a project, either government or private lobbying.

The counterpart to allowing partners a role in domestic politics is obtaining influence over other countries activities. Internationalization means the surrender of some power and control of an activity but also adds some

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[22] Richard Truly, Interview With Author, 4 September 1998.

influence over the actors' activities. For example, in the SSP, foreign officials have participated in some of the redesign efforts to protect their interests, but the US gained greater influence over the direction of space flight research in partner countries.

This influence may be low level and aimed at persuasion or providing information. In more extreme cases, a state may attempt to capture or co-opt another state's policies or actions. In the case of the SSP, no direct evidence of overt co-option was found. The officials interviewed for this study specifically denied that the co-option of allied space programs was ever a goal of the SSP. The official record also shows no direct statement to that effect. However, the outcome of cooperation led in the direction of co-option. The countries with smaller economies and/or space program would have found it difficult to engage in any other major space activities if they committed large sums to the SSP. For most of the partners, the Space Station, was a major commitment and it would be unlikely that they could have done anything else major in addition. While not necessarily co-option, it was a strong relationship of dependence.

Unanticipated dependence aside, what is found was a stated desire to ensure that the partners continued to cooperate with the US in space. The fear of the partners "going it alone" was a recurring theme in the literature. Although it was an unlikely scenario, the possibility of the partner states building an independent space station was often raised in the policy discourse as a warning against breaking American promises. Another policy direction that the US sought to guide the partners away from was cooperation with the USSR. Although there was some cooperation between the Soviet Union and US allies during the 1980s, particularly France, there was little chance that the partners would abandon their relationship with NASA for the Soviet space program. Nonetheless, it was made plain in the Space Station discourse that a stable and consistent SSP would be necessary to avoid this outcome. Therefore, while a take over of the allies' space programs was not a goal of the SSP, it *was* a goal to link the allies closely to the US space program and to direct the direction of their activities in space. This was both to benefit the US by accessing their capabilities and skills and to limit their contacts with the Soviet Union.

In the post Cold War era, there is a different tone. Influence over the Russian space and science programs became an explicit goal of the ISS. The phraseology is far less diplomatic and explicitly states that the ISS is important for ensuring Russian arms control compliance: "The Space Station... [h]elps focus the aerospace industry of Russia and other countries on non-military pursuits to reduce the risk of nuclear proliferation and slow the traffic in high-technology weaponry to developing nations."[23] The potential of Russian science

[23] NASA, *ISS Fact Book 1998* (Washington: NASA, 1998), 7.

is too great to be left to its own devices. In the post Cold War era, the SSP became an explicit foreign policy operation, as opposed to the pre-1993 period when it was a domestic program with a foreign policy dimension.

Importation of Foreign Policy Issues (Foreign Policy-ization)

Importation of ideas, images, language, and issues from foreign policy, especially international security, into domestic policy-making is another strategy that can be used to build support domestically for desired policies. Importation can be best defined as linkage though logic or association of different policy fields and the application of concepts to different fields. It includes the use of the language, issues, or concepts of a state's foreign policy by domestic actors for use in domestic policy debates unrelated to foreign policy. The idea of power is central to the pursuit of foreign policy and the enhancement of national power may be used as a justification of a purely domestic act. A domestic policy may enhance national power directly (such as military spending) or indirectly (as in increasing the number of high technology jobs). "Soft" domestic issues can be converted (both in reality and rhetorically) into national power and influence by careful use of language and framing.

Importation helps to increase the importance of an issue by tying it to vital national interests and thereby elevating its political status. It also helps to counter opposition by bundling issues together, expanding the base of supporters and tying values together. It is harder, for instance, to argue against the preservation of American "technological leadership" than against space exploration for its own sake.

In the SSP, the clearest association was to the concept of security. Security, itself being slowly imported into domestic political debates as "economic security," readily fit into the policy world within which NASA operated. The source of security threats was multiple: both the Soviet Union and US allies were describes as threats, though of different degrees.

During the first part of the period studied (1980 to about 1991), NASA placed a good deal of stress on Soviet space activities. This was in part recognition that the USSR was the only other major actor in space and posed the greatest political-symbolic "threat." However, it was also a deliberate strategy to link the space program to the sense of a generic Soviet threat, heightened since the late 1970s and further accelerated during the Reagan-era "second Cold War." The *Salyut* and *Mir* stations were highly visible and were presented by NASA as "challenges" to be met. They were not specified as threats but referred to as part of a threatening trend, as part of an "aggressive" or "ambitious" program of expanded human presence in space. The Soviet card was a conscious play by NASA. One internal memo (previously cited) noted: "The point cannot be made to strongly that we must highlight the fact that the Soviets already have a space station in orbit and, as part of an aggressive space program, are planning to expand the capability represented by Salyut."[24] It is worth noting that the Soviet program was described as a definite, coherent plan. While not stated directly, the logic of the "Soviet card" was that international competition and strategic balance required that the US match Soviet activities one for one: if the Soviet Union built a space station, it is in the US interest to build one as well.

To fully understand the value of importation, it is important to note the expandability of the concept of security. Historically, it has been the foreign policy of states that has been the primary focus of historical and international relations study. Until comparatively recently, the study of history was almost coterminous with the study of war and the duplicity of diplomats and rulers. It is not unreasonable to describe the period leading up to the Second World War as the era of the "foreign policy state," as national policy was consumed with foreign affairs. While other issues now compete for the attention of leaders, the notion of security remains a central and often unquestioned political value. The concept of national security has expanded to include the trade balance, high-technology jobs, science and technology development, and national prestige. It is important to distinguish between different degrees of threat. Hard threats are military and other dangers that imperil the security or existence of the state.

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[24] Finn, "Note to Culbertson," (NASA Historical Collection, 1981), J.

Less dangerous, but still important concerns, are soft security threats. Soft security threats endanger a state's economic security or social system.

The manner in which foreign policy becomes a reason to act domestically depends on a number of factors in part on the perception of threat. Does an external danger threaten the existence of the state or does it pose a "softer" threat to a state's economic position? The immediacy of the threat is also important. Is the threat imminent or long term? Does it require rapid response or a long-term strategy? We may also distinguish between a perceived crisis and a perceived non-crisis. While *Apollo* might possibly be seen as a response to a perceived crisis, civilian space projects pursued after 1969 are harder to classify as "crisis-driven."

The SSP case offers this additional understanding of the *use* of political ideas: an overriding factor in both the influence and manipulation of foreign policy in domestic politics is the perception of an external threat. Threats may occur in different forms and in varying degrees. Additional questions relating to domestic responses to external threats must be examined. Is an external danger perceived as threatening the existence of the state, or does it pose a "softer" threat to a state's economic position? The perceived immediacy of the threat is also important: is the threat imminent or long term? Does it require rapid response or a long-term strategy? Do policies begun in a perceived crisis persist and take on a life of its own?

Elite Convergence?

One possible explanation for the SSP case is the convergence of elite opinion around a particular position or policy option. In the interaction of foreign and domestic policy, elite convergence may be hypothesized as the adoption by policy-making elites in foreign policy and domestic policy agencies of a single policy that benefits both internal and external interests. This convergence on a single policy is due to a common or convergent interest. The domestic elite may be defined as those agencies or actors charged with social welfare, domestic economic policy, or other internal affairs. Science, technology and R&D agencies, such as NASA, may be placed in this category as well. Foreign policy elites include the diplomatic and national security community actors.[25] The early Space Station Project did reflect Cold War sensibilities: the partners were also military allies and the identified competitor in space was also the common enemy.

However, the SSP however does not generally match this model. The Department of Defense was almost uniformly hostile to the Space Station. Even efforts in the late 1980s by the DoD to secure access to the Station seem to have been intended to unravel the international agreements and derail the project rather than a conversion by DoD to the NASA line. The Department of

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[25] Some government agencies may combine domestic and foreign policy responsibilities, such as trade and law enforcement.

State was largely apathetic to the project after it was initiated and never attempted to use the Station as leverage or to promote separate US interests, with the single exception of Russian compliance with the MTCR. That policy itself appears to have emerged from the White House rather than the State Department. Therefore, the SSP remains a case of an idea that captured the attention of decision-makers but not a convergence by different elites.

Conclusion

Several conclusions may be drawn from the foregoing analysis. First, policy-making as a practice relies heavily on presentation. The SSP was initiated and sustained due to the ability of its advocates to make appeal appropriate to multiple audiences. The SSP was justified by promises of national prosperity and international prestige, claims not uncommon in very expensive government ventures. However, these were tempered with other arguments that appealed to values of cooperation, progress, and discovery. The Space Station demonstrates that policies can have diverse justifications that extend beyond traditional understanding of policy fields or topics. It is clear that policy advocates are not limited to arbitrary boundaries when promoting or defending a policy proposal. The diversity of justifications in the case of the SSP served the project well over the course of its history.

A second conclusion that can be drawn is that the process of argumentation itself can shape a policy. The analysis presented here reveals that language can shape policies as well as describe them. The very act of definition can change the policy being defined and shape into a new form. The policy/political process can change a project like the SSP from what an imagined set of engineers would do in isolation. Budgetary limits are one obvious form of restraint but there are other more subtle factors at work. Arguments can shape policies. For example, as the SSP was promoted as contributing to American competitiveness, the design and use of the Station had to reflect those priorities, even if it risked undermining the relationship with the international partners who themselves were seeking economic gain from the SSP.

A third conclusion relates to the utility of arguments and justifications. The arguments that we have examined are diverse in nature but also in their effectiveness; arguments do not all have the same weigh of influence. The use of foreign policy arguments gave the SSP a stronger claim to national significance than a project defined solely in a domestic framework. The promotion of American prestige, alliance cohesion, and economic security rhetorically enhanced the value of the Space Station. Therefore, it should be understood that while modern governments must grapple with many diverse concerns, matters of security remain paramount. The meaning of security itself is less concrete. The SSP clearly demonstrates that security is defined *both* as military and economic security. Associating the SSP with the most critical concerns of political actors helped to initiate the Project in 1984 and helped to save it in 1993. The power of foreign policy ideas within domestic policy-making is the normative value ascribed to the concept of security. This association acts as a form of elevation, raising the "domestic" to the level of national security.

Finally, the model that is offered here provides a new way to look at policy-making, not a closed loop within an agency, issue network, or country, but rather as diverse matrix or web of actors, ideas, and processes that extend around the world. International politics as a field begins to resemble *world politics*, a broader and less hierarchical entity. Domestic politics is no longer the events that take place within the black box but an integral part of the process of world politics. Our examination of the SSP reveals that the different levels, games, and networks of political activity merge and blur into each other. Bridging these different elements together, politics becomes a richer realm of study and some of the processes occurring therein become clearer.

CHAPTER NINE

DISCUSSION AND CONCLUSIONS

> I'd say that there's a decent chance that October 30th [2000] may be the last day we don't have people in space.
>
> John Curry, Space Station Flight Director, 1 November 2000

The launch of the Expedition One crew on 1 November 2000 was the culmination of years of political and technical efforts. These were difficult years, for Station advocates often appeared to be fighting a losing battle against political opposition and public apathy. Expedition One marked the end of one era of the Space Station Project and the beginning of another, potentially just as difficult- sustainability. The long-term success of the SSP remains a political uncertainty. While politics and technology may converge at certain moments in history, there is no natural alignment between these separate elements of society. Similarly, foreign and domestic policy may interact but that relationship is not constant. In addition, the matrix of ideas and concepts necessarily conform to policy-maker's desires.

This Chapter shall offer several conclusions. First, it shall explore what did not happen in the SSP case by presenting three counterfactual histories of the project. Second, it shall discuss the SSP in the context of US foreign and domestic policy-making and present several theoretical and policy conclusions.

Third, it shall suggest additional cases that could be the subject of further study using this approach developed here.

The Space Station As History: Alternative Paths

The Space Station Project was subject to many divergent political forces in its history. Several of these forces could have driven the SSP onto different political paths. The evolution of the SSP was the result of its political image, best conceived as a combination of the labeling, presentation, and justification. The balance between the different political, economic, technological, and social forces was delicate and the history recorded here was by no means predetermined. Considering the history of the SSP and the political forces that acted upon it, three alternative outcomes may be imagined.

Image One: Domestic Interest Over All

One alternative outcome for the SSP could have been the domination of domestic policy issues. Considering the economic problems of the 1980s and early 1990s, the domestic policy concerns used to promote the Project easily could have dominated it to the near exclusion of international partners. In such a reality, domestic benefits, especially employment and technology, would have emerged as the most important political justifications. If their importance had been dominant, international cooperation could have been rejected or minimized due to concerns over technology transfer and competitiveness. In such a case, there would not have been a rejection of foreign policy interests, but a narrowing of the foreign policy element to economic competition. Economic security would have become the most important argument and competition with economic rivals would have become the main political rationale for the SSP. The Project would likely therefore to have been exclusively an American program, with limited access and use allowed to other countries.

This limited type of political justification would have posed problems for the SSP and its advocates. Had the SSP had been formulated according to this rationale, it would have been much more difficult to generate significant political support within the US government. The economic benefits of the SSP have always been uncertain, making a purely economic rationale non-viable. NASA never could put a firm dollar amount on the benefits the Station would allegedly produce. Even the promise of aerospace jobs would not likely to have been sufficient to sustain the SSP over a decade of development. Opponents of the SSP would have found such a rationale easy to disassemble and critique. There would have been far more efficient, direct, and politically popular means than the SSP to channel federal money into high technology development.

This possible history did not occur for several reasons. The projected price tag of the Station meant that international participation was needed to give the illusion of lower costs for the US. International involvement to lower costs was an idea that had grown in NASA since the Nixon Administration and the Space Shuttle. There were also institutional tendencies within NASA that tended in the direction of cooperation. The positive experience (from the American perspective) with *Spacelab*, enhanced the desirability of international participation. The participation of other countries also had a secondary political benefit. The partners were wary of military uses of the Station, which provided a valuable reassurance for liberal members of Congress concerned over the militarization of space. Internationalization occurred because it was valuable for creating wider political support base. NASA needed a wide coalition to promote the SSP; recruiting international partners put US credibility on the line, making cancellation more difficult. Finally, the image of a "Free World" project gave an additional normative dimension to the SSP.

Image Two: Symbolism and the Cold War

A second possible reality suggested by the history of the SSP is the opposite extreme of the first. It is possible that political symbolism could have dominated the discourse to the exclusion of other values. Had the SSP existed in an environment closer to that of the Apollo program, political symbolism could have dominated, creating a space station designed more as an emblem than a workplace. The Cold War environment of the early 1980s would have easily facilitated such a rationale. The tendency of western European states to normalize trade relations with the Soviet Union had caused some anxiety in American ruling circles. This alone would have been a strong incentive to bring western Europe into joint projects in order to separate them technologically from the Soviet Union. In reality the SSP was heavily marketed as a symbol of "Western" and "Free World" solidarity against the Soviet "Evil Empire." SDI and the program of political/military/economic confrontation with the USSR were powerful forces in the early 1980s. The SSP could have easily become fully imbued with this agenda.

However, this type of Free World symbolism did not come to dominate the SSP. Such a strictly Cold War motif for the Space Station would have run aground on domestic politics, where Cold War confrontation was not universally embraced. NASA needed to appeal to various domestic elites, including those uncomfortable with the militarization of space and the revival of the Cold War. Down playing peaceful scientific pursuits would have deterred potential sources of domestic support. In addition, the end of the Cold War and renewed concern over budget deficits almost led to the Station's cancellation in the early 1990s. An even closer association with the Cold War without countervailing rationales would have likely proved fatal during 1989-93. The SSP was able to survive this transition because, although it was a product of the Cold War, its political rationale was richer; peaceful cooperation and the benefit of "all mankind" were constant themes that provided an alternative vision for the project. The success of the SSP was its flexibility when the space race was no longer a viable political rationale.

Image Three: Battlestar Freedom

A third alternative that the SSP could have followed was a purely military/security rationale. This policy option would have made the primary mission of the SSP national security. Facilitating the SDI program would have been the most obvious military mission for the Space Station. The SSP in its earliest conception could arguably be seen as the Reagan Administration's non-military partner to SDI.[1] Foreign partners would be acceptable but only those with pre-existing military ties. This relationship would likely have been bi-lateral and limited due to allied apprehension about SDI testing or deployment. Domestically however, there were precedents for NASA-military cooperation that could have formed the basis of such a policy option.

However tying the SSP to a controversial element of the Cold War contest would have given the project too limited a mission and, more importantly, a greater number of enemies. Such a narrow political rationale would not have been sustainable over time and would have been unlikely to win support of many liberal democrats in Congress, a core NASA support base. As

[1] I am indebted to Margaret Hermann for this observation.

SDI's political support waned with the passage of the arms race, the SSP would have fallen with it. The Clinton Administration would also have been less likely to support a SSP with militaristic overtones. Fiscal constraints and the end of Cold War confrontation would have doomed a Space Station with such a narrow mission.

This alternative did not occur primarily because of the lack of interest by the Defense Department in the Project. The Pentagon was fairly hostile to the Space Station idea, fearing budgetary competition and diversion of Space Shuttle resources. Democratic members of Congress, like the influential George Brown, were also opposed to military use of the Space Station. Institutional separation between NASA and DoD also made this more difficult. In the end, DoD contented itself with obtaining access to the Station while trying to discourage its construction. NASA briefly played the national defense card but wisely did not push this too far, ultimately abandoning it entirely. Therefore, this military policy option did not occur, despite temptations to follow that path.

The Reality: Strength in Diversity

Previous chapters of this study illustrated the wide range of ideas and concepts that have been inducted into the Space Station campaign. The missions proposed for the SSP cover a broad swath of the pure and applied sciences. Alleged benefits cover a wide range from economic growth to *realpolitik* calculations of foreign policy. The diversity of argumentation resulted from two elements. First, the design of the Space Station was intended to maximize its operational potential. The SSP is a multi-purpose facility designed to attract many different users. The range of arguments made in favor of the SSP represent this diversity of function and use. As the SSP is the only space station likely to be in operation for the next quarter century, many of the aspirations of space advocates, from commercial development to exploring Mars, have been linked to the project. The SSP is also the culmination of past NASA experience. Space launches and facilities are still rare opportunities for researchers. There is, therefore, a tendency to “pile on” to space projects as many mission elements and experiments as possible. The Space Station shows this same tendency.

A second and more important reason for the diversity of arguments, is NASA’s deliberate strategy to promote the Space Station. The campaign pursued by NASA necessitated maximizing the number of potential political supporters. This was done through identifying every possible mission, use, or benefit that could plausibly be identified with the SSP. The project was also linked to a set of social values that were regarded as widely heid by the public and political elite, such as education, economic growth, and American prestige. The survival of the SSP was due to its ability to embody multiple interests and a mix of foreign and domestic interests. Long-term domestic interests (high tech investment, education) provided the means to ride out the more ephemeral foreign policy/security justifications offered for the program in the early 1980s. It was this diversity of arguments that gave the SSP its durability in the face of political opposition and public disinterest.

The Space Station As Policy: Lessons Learned

The reality of the SSP resembles a combination of these different extreme alternatives. The Space Station was tied to diverse policy areas including domestic economics, national pride, cooperation, and Cold War politics. These diverse ideas gave the SSP a flexible menu of political rationales and justifications. Therefore, the survival of the Project hinged on its ability of its promoters to employ and balance diverse domestic and foreign policy interests. This was made more difficult by the fact that some of the different justifications offered potentially conflicted with each other. Another factor was the program's political adaptability in the face of broader political change. Had the Space Station been tied solely to the Cold War and perceptions of the Soviet threat, it likely would not have survived the transition to the post Cold War world. Likewise, had the project not included Cold War imagery along with international cooperation, it would have been less likely to have initiated in 1984. An excessive reliance on Cold War imagery would have found the SSP less able to transition to the post Cold War political environment. The Project embodied a diversity of political, economic, and social justifications that gave it multiple avenues in times of change.

Examining the Space Station Project, several theoretical and policy conclusions can be made. These, while drawn from the SSP, also have general significance to policy-making. These conclusions are divided into four sections: 1) foreign policy, 2) domestic policy, 3) domestic policy verses foreign policy, and 4) ideology.

The SSP and Foreign Policy

Foreign Policy Goals

The first question posed in Chapter 1 asked about the linkage between US foreign policy and the SSP. In the period corresponding to the Cold War, the Space Station was associated with several American foreign policy interests including alliance solidarity, economic competitiveness, and competition with the Soviet Union. After the Cold War, the foreign policy issues most frequently used was the integration of Russia into the community of democratic states and ensuring Russian adherence to arms control. Across time, a vague goal of international cooperation was constantly voiced. National prestige also appears across time, concurrent with more concrete dimensions of power.

The Space Station Program originally was, and remains, a predominantly political undertaking. At birth the Space Station was a child of the Cold War intended as a symbol of American power and a tool of its foreign policy objectives. As those objectives changed, the political rationales of the Station changed with them, but the political purpose remained intact. Supporters constantly used foreign policy as a justification for the Station, though the specific arguments did change over time. The SSP represents multiple goals, each of which contains an element of foreign policy, whether direct or indirect. An additional point to consider is the persistence of the notion that foreign policy is more important and should have a higher priority than domestic politics. The SSP, a domestic program, was linked to foreign policy to emphasize its importance.

These foreign policy objectives were not tied to a specific crisis or decision but were woven into a general understanding American national interests: alliance cohesion, prestige and leadership. Both competition and cooperation were important strands in this overall pattern. The persistent idea that appears is that the Space Station would enhance US national power and its leadership in high technology. This idea is tightly bound to the belief that science and technology enhance national power and prosperity. This assumption also has a national power connotation, for the Space Station is presented as central to the US position vis-à-vis other states. Other states could participate but only as adjuncts to American power. Cooperation, in this context, is largely an effort to avoid being overtaken in a race for Humanity's future. In the final analysis, partners are also rivals.

This emphasis on American interests coincides with images of a *human* future in space. Recognizing the necessity of international participation for grand schemes of space colonization, the discourse still emphasizes American leadership. In a subtle transformation, Humanity's future in space becomes merged with the future of the United States. The question remains of whether true cooperation exist where one partner, the dominant partner, welds an overwhelming degree of control? The US status as senior partner and manager of the Station has made many of the managerial patterns unilateral, with little input from the occasionally frustrated partners. Space could possibly prove to be a unique means of uniting the efforts of the world's nations, but genuine cooperation must leave such aside notions of national advantage and superiority. The ISS as currently formulated clearly in meant to benefit the US first, its partners second, and the broader world only as an afterthought.

The Concept of "Threat"

A second conclusion that can be drawn from this case is the notion of "threat." The SSP indicates that the theoretical understanding of the concept of threat can be expanded. Clearly threat is not an objective concept that can be clearly enumerated but one that is subject to wide interpretation. The identification of threats is a psychological and subjective process where uncertainty of intent merely complicates a calculation already clouded by emotion, history, and imperfect information. The concept of threat in international politics is highly expandable as it involves many different dangers to a state or society, from military defeat to cultural "invasion." These different types of threats can produce radically different responses but can still be used as a means of political persuasion or control.

The word threat was rarely used in the SSP literature. However, terms such as "challenge," "competition," and "rivalry," were freely used in publications and speeches. These terms served to indicate *softer* forms of threat that came from both the traditional Soviet enemy, but also American allies and trading partners. Negative consequences (albeit different in scale) could arise from any of these actors. These threats were of different degrees and required different responses. Indeed, while the Soviet Union was too militarily dangerous to work with, the allied nations seemed too dangerous (economically) to leave out. The allies were commercial rivals in space and on Earth. The Soviet Union was a military threat but eventually was also a commercial rival. Therefore, the US had to work to keep up with the USSR, keep the allies cooperative, and prevent collaboration between the allies and Moscow.

This experience provides an important lesson for the broader study of IR. Actors may identify a wide range of phenomena as threats and many threats do not call for military responses. Soft threats are challenges that are indirect, do not endanger sovereignty and may exist at a low level for an extended period. Such threats may be countered by policy changes, co-option of the source, or long term planning. Closer to traditional IR theory are hard threats, those that potentially threaten the sovereignty or existence of the state. These threats must be responded to in a more traditional manner. The threats that the SSP was designed to remedy were primarily of the soft variety, although the Soviet Union was a hard threat in so many other areas that it could not be considered for partnership in the SSP until after the end of the Cold War.

Foreign Policy as a Rationale

The SSP was heavily marketed as a means to national power and glory. However, foreign policy alone may not be able to sustain a domestic program. As stated, a mix of domestic and foreign interest may be needed. Foreign threats or crises can have a great mobilizing effect, but cannot guarantee long-term success. It is important to have both domestic and foreign policy support. The best example of this need is the Apollo program. While the US civil space program continued after Apollo, it was at a much slower and less expensive pace. Apollo itself was cut short after the foreign policy goal, beating the Soviets to the Moon, had been achieved.

However, there are positive elements of the foreign policy rationale. The need for the US to keep its commitment to other states has been used to defend the SSP and other space projects before Congress. This sort of argument is positive because it encourages consistency in US policy and can discourage unilateral policy changes in collaborative projects, although not always successfully. International cooperation itself is a positive good because it potentially reduces costs for each state and allows for more elaborate activities than a single state (even the US) could accomplish alone. In particular, cooperation as a way to promote peaceful relations with Russia is also valid, though not a goal in itself. The ability to keep the Russian scientific community active has value both as a way of enhancing Russian political stability but also as a means of preventing the export of engineering talent. Russian participation in the SSP may help to keep Russia visible in space with a reduced cost to its weak economy.

Space as a Domestic Policy Area

Domestically, space policy in the US is a routinely non-partisan issue, advocates and opponents exist in both major political parties and the appeal of space ranges from the left to the right of the political spectrum, though representing a minority of political actors.[2] Those that are interested in space are strongly interested, for personal reasons or for local politics. However, this is not a monolithic bloc; not all space advocates have supported the Space Station. Many feared that Space Station budgets would denude NASA's budget and undermine space science or Shuttle operations. In addition, support for the Space Station has not been absolute under all circumstances. James Sensenbrenner, a strong supporter of the project for many years, has become a vocal critic of NASA's relationship with Russia. His previous endorsement of the SSP has not meant that his support is unreserved. The pro-space political community therefore, is not a solid or consistent bloc, even though it may share many common goals.

The Search For the Elusive Paradigm

The US space program has been highly political since its birth. The foreign policy element has always been strong in space policy, whether the concern was political symbolism in the 1960s, or economic competitiveness in the 1990s. Whereas the space program was arguably a tool of foreign policy during the "space race," in the post-Apollo era this has not always been the case. While NASA officials have tried to use foreign policy as a motivation for

[2] Thomas Frieling, "Congress and the Space Program." *Space World* W-10-274 (October 1986): 30.

space activities, domestic issues, especially economics, have come to center stage.

This study confirms the conclusions of many other scholars of the US space program.[3] The lack of a broad, paradigmatic, political goal has proven to be a problem for NASA. The agency has yet to be given a "formal national goal."[4] Although Mars remains the unofficial goal of the US space program, an Apollo-style mission to the red planet lacks political or public support, a condition unlikely to change in the foreseeable future.

In place of this, several smaller goals have been offered. The Space Station attempted to incorporate some of these other goals (Earth observation, Mars) and most importantly, to bridge the foreign and domestic issues of the day. This approach has been flexible as needed: competition with the Soviets or strategic partnership with Russia. Overall, US space policy has lacked a guiding direction with both broad elite and public support. The Space Station is a big project, but it is not strong paradigmatic mission with the likeliness of public interest. Questions still remain about what NASA shall pursue *after* the

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[3] Dwayne A. Day, "Paradigm Lost." *Space Policy* 11:3 (1995): 153-9.
Joan Johnson-Freese and Roger Handberg, *Space, The Dormant Frontier: Changing the Paradigm for the 21st Century*. (Westport (Connecticut): Praeger, 1998).
W.D. Kay, *Can Democracies Fly in Space? The Challenges of Revitalizing the US Space Program*. (Westport (Connecticut): Praeger, 1995).
John Logsdon, "A Sustainable Rationale For Manned Space Flight." *Space Policy* February (1989).
[4] J.R. Dailey, "In Defense of the Space Station: Issues and Strategies For the FY '94 Budget Cycle." (Washington: NASA Historical Collection, 1993), 1.

SSP. In addition, the high cost of operating the Space Station may very well preclude other activities, should another long-term goal be established.

However, at present the SSP essentially *is* the United States human space flight program. In 1989, John Logsdon noted, "Terminating the US manned program altogether would clearly be politically unacceptable."[5] That may still be true but there is currently no support for *expanded* human space flight. A decade later Logsdon wrote, "[w]ithout the station, the case for governments continuing to send people into space collapses, since there is no current political will to resume deep-space exploration."[6] The Space Station has been effective in keeping NASA in business and giving the Space Shuttle a reason to fly, but two fundamental problems remain: the SSP has no planned successor and, more critically, without human space flight, NASA has no central mission.

The Presidential Model of Space Policy

NASA's political attention continues to be focused on the president, although this has proved a mixed success.[7] The presidential model of space policy making is based on the classic Apollo decision of 1961. Convincing Ronald Reagan of the value of the Space Station was the primary concern of

[5] Logsdon, "A Sustainable Rationale For Manned Space Flight," 4.
[6] John Logsdon, "Why Has the Space Station Survived?" *Space News*, 5-11 January 1998, 15.

James Beggs and his NASA team in 1983. Presidential approval was the agency's central objective. A NASA planning slide from 1982 shows lines of lobbying efforts flowing out from NASA to branches of government, academia, media, and foreign partners, all eventually converging on the office of the president (the chart is reproduced in Appendix 3).[8]

The SSP case demonstrates that NASA's traditional focus on the presidency remains intact from the Apollo era. This continues to be true although the later history of the case indicates a greater awareness of Congressional power. This focus is not entirely unwarranted, for the SSP does owe its birth to Ronald Reagan beyond any other figure. The presidential strategy worked in 1983, for Reagan was clearly enamored of the space program. The Space Station idea caught Reagan's imagination and he became the Project's best ally in the 1980s. The strategy was also reasonable considering the nature of American politics. Only a President could have initiated such a program. Hans Mark and James Beggs both noted the interest of the President in Shuttle flights and his support for the SSP as reflective of true interest. Reagan himself in a 1983 interview cited watching Shuttle

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[7] Critical examinations of the presidential model of space policy are contained in, Roger D. Launius, *NASA: A History of the US Civil Space Program*. (Malabar (Florida): Kreiger, 1994).
[8] NASA, [Untitled Presentation Slide Attached to Terence Finn, "Note to MT-14/John Hodge." (Washington: NASA Historical Collection, 1982). Slide NASA HQ LG82-848 (1)].
The same year, Terence Finn wrote to John Hodge suggesting that "our strategy should be what it has been all along: to try to have the White House (either the President or a senior aide) tell OMB to let NASA have some space station money" (Terence Finn, "Note to MT-14/John Hodge," 2).

landings as a highlight of being President.[9] The survival of the SSP in 1993-4 was also due to presidential action for many factors were working against the Project at that time. In both cases (1983, 1993-4), the SSP was utterly dependent on the decisions made by presidents.

However, the "presidential strategy," pioneered in the Apollo era and pursued by NASA ever since, does not take into account the shifting fortunes of that office. The Presidency of Ronald Reagan was weaker than that of John Kennedy. In 1984, Congress was less deferential to Presidential plans. Congressional support was made possible due to a core group of supporters that fought for its passage and continuation. This support was not a factor of deference for presidential desires. By the Clinton Administration, the Presidency was weaker and the president himself had a weak electoral mandate and a fractious relationship with Congress. In 1993-4, NASA sought and won the hoped-for, but not guaranteed, support of Bill Clinton to continue the Project. However, the decision to include Russia was more controversial than the decision to start the SSP itself. Congress was even less accommodating to presidential desires due to rising institutional rivalry and partisan bitterness. The SSP eventually became caught between institutions

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[9] Ronald Reagan, "Responses to Questions Submitted by Bunte Magazine, 25 April 1983," In *Public Papers of the Presidents of the United States: Ronald Reagan, 1983, Book I, January 1 to July 1, 1983.* (Washington: US Government Printing Office, 1983), 679.

controlled by different parties and space policy itself became less collegial and more partisan.

The Apollo myth states that Kennedy spoke and the nation followed. While never as simple as this, Apollo created the perception that the president can initiate a space policy by clearly announcing his will. The SSP, while begun by presidential direction, was delayed and nearly lost because of the ability of Congress to mandate changes and control budgets. The absence of public interest in the project limited the political cost of opposing the SSP. While presidents can *initiate*, sustaining a policy requires more widespread political support. As Hans Mark noted in his memoirs, a dictum of American government is that "The President proposes but Congress disposes."[10] Presidential power is insufficient, especially in an environment with limited public interest, to carry out a large-scale project in space. The presidential model of space policy is too limited a conception of this policy area.

"What Is It For?"

The fundamental problem that continues to dodge the SSP is its ultimate purpose, the question of "what is it for?" identified in Chapter 5. Setting aside the foreign policy justifications for a moment, it is difficult to identify a clear purpose for the SSP that would have an immediate pay-off for most Americans.

Claims that the SSP will help spur the economy are speculative at best. It was probably not the most cost effective way to create jobs, even for the aerospace industry. The more abstract societal goods that Station advocates promised are valuable fringe benefits but only if other, more concrete, benefits also accrue from the Station. It is significant that most of the lobbying for the SSP came from the project's contractors, not its potential users.[11] Although engineers may enjoy the challenge of complex work for its own sake, the spending of large amounts of government money cannot be justified on aesthetic values alone.

There have also been serious questions about the scientific utility of the SSP raised by the space science community.[12] Scientific organizations did not support the project in any substantial way. Scientists, both in and out of government, have publicly expressed doubts that it will produce scientific value proportional to its cost. Within the space science community many doubt that a piloted space station could perform space science missions as cheaply or efficiently as satellites.[13] However, it should be noted that there is a general

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[10] Hans Mark, *The Space Station: A Personal Journey*. (Durham (North Carolina): Duke University Press, 1987), 197.
[11] Helen Gavaghan, "Space Station's Future Hangs in the Balance," *New Scientist*, 24/31 December 1987, 2-25.
[12] Theresa M. Foley, "Scientists Warn NASA of Threats to Space Station Usefulness." *Aviation Week and Space Technology*, 24 November 1986, 18-9.
[13] For example, Bruce Murray of the Planetary Society (Richard G. O'Lone, "Scientist Sees Space Station Useful Only if Linked to Manned Mars Mission," *Aviation Week and Space Technology*, 25 January 1988, 55-6.
See also T.M. Donahue in Mireille Gerard and Pamela Edwards, ed., *Space Stations: Policy Planning Utilizations*. (New York: American Institute of Aeronautics and Astronautics, 1983) and Paul Mann, "Scientists Propose Return to Unmanned Vehicles as Primary Launch System". *Aviation Week and Space Technology*, 28 July 1986, 27-8.

ambivalence in the scientific community about piloted space flight. The primary fear has been that the Space Station could become a monster absorbing increasingly large segments of space budgets thereby squeezing out other programs. The Shuttle program had just such an effect in the 1970s. An additional problem with science on the station is the difficulty of conducting materials processing experiments on a spacecraft occupied by humans.[14]

The most serious criticism of the Space Station attacks the Project's need for humans in space. In almost any application, robot satellites and probes are cheaper to build, insure, and operate. The loss of robot craft, while expensive and embarrassing, does not generate the political and legal problems that are caused by accidents that involve a loss of life. It is also true that satellites provide almost all of the practical benefits of space, if one speaks of monetary value alone. Space science, as well, has been advanced primarily by automated probes such as the *Voyagers* and not by spacecraft with human crews.

Although many of the Space Station's proposed activities could be carried out by other means, there are legitimate reasons for humans to be in space. There are activities (primarily revolving around life science) for which humans are essential. Some biological experiments can be conducted in an unpiloted facility but the effect of weightlessness on human physiology and psychology requires a human presence. However, this argument is only valid in the context of a Moon/Mars missions. Beyond this, humans are needed in space for few missions beyond those that demand a human presence for its own sake.

Returning to political justifications, traditional pork barrel politics does not always press the question of utility. The economic benefit to local businesses is often sufficient justification for expensive government projects. This economic benefit (however limited) is one possible answer to the utility question. As the SSP provides millions of dollars in contracts and employment for some Congressional districts, the grand utility of the project is not an issue to some supporters. However, this question is not addressed only to this community but to the whole political establishment. The dilemma of "what is it for?" remains and will continue to be a challenge for NASA in the future. This dilemma however is more generic and can affect any high cost S&T project. The lesson for domestic space policy-making is the need for multiple missions and rationales to ensure as widespread a support base as possible.

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[14] The movement of the crew would produce subtle movement of the Station, reproducing in a

Foreign Verses Domestic Policy

Conflicting Interests

The role of foreign policy in the SSP is important but it was not the only influence on the project. It would be a mistake to regard the SSP, or any other space project, solely in terms of foreign policy, prestige, or international competition. The foreign policy dimension "topped off" the SSP and allowed it a broader range of justifications. Alone foreign policy would not have enabled the SSP to survive as long as it did. Foreign policy was a vital ingredient but only in combination with other factors, such as industrial return and scientific research.

As noted, many of the arguments in support of the SSP were in tension, and some were contradictory. International competition may conflict with cooperation in broad terms but also in many specific policy areas. If the SSP is vital for national power and prosperity, can it be safely shared with economic competitors? Technology transfer is one problem raised by cooperation. Technical cooperation almost invariably leads to sharing of knowledge and know-how. The degree to which those gains will benefit economies are unknown. The relative gains dilemma is another problem. American majority-share of Station resources may offset the potential gains by the partners, but those partners will still gain from the project and their association with NASA.

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minute form the gravity that material processing experiments in space are aimed at avoiding.

Internationalization: Two Edged Sword

Another factor to be considered is the potential harm internationalization space may cause to the space program itself. The close association of space with foreign policy that has been discussed here is a two-edged sword from the standpoint of the space program. The Apollo program was born in the fires of the Cold War but could not be sustained after the "race" was won. The space race model, born after *Sputnik*, was unsustainable, although it persists in much of the pro-space community.[15] International cooperation alone is not a sufficient prop for a space program. Cooperation cannot replace domestic political or public support.[16] Projects that are internationalized can be at the mercy of other governments. The SSP was restructured in 1993 to fit current US foreign policy interests but presently is in danger of failing due to the inability of Russia to fulfill its obligations. The SSP provides a warning of the dangers of the strategy described here. International projects are vulnerable to shifting national priorities that are independent of the project itself and may undermine its collective goals.[17]

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[15] Marcia Smith, "Lessons Unlearned: Space Policy After *Challenger*," *Space World*, October 1987, 21.
[16] Kenneth S. Pedersen, "Thoughts on International Space Cooperation and Interests in the Post-Cold War World," *Space Policy*. August (1992): 205-20.
[17] Marcia Smith, "Space Stations," (Washington: Congressional Research Service, 1999), 4.

The Ideology of Power

A question posed by this study was the link between national security and national power considerations that is made in science and technology policy. As seen in the SSP and contemporary space policy, national security has been relevant in several ways. Constant references to the importance of space for national security and prosperity derive much of their force from notions of the importance of technology. S&T are associated with the components of national power: wealth, technology, and resources. Working with a group of less endowed allies proves leadership, another dimension of power. Finally, prestige is a symbolic element of power, enhanced by impressive acts. All of these elements were present in the SSP discourse and were explicitly tied to national power and the ability of the United States to prosper and succeed in a competitive world. The assumption that technology produces power is not justified, but is stated as self-evident. The assumption that space is the pre-destined future of Humankind is another claim that is not justified beyond historical analogies.

One principle learned from the SSP experience is the association of knowledge and power within American political discourse. This principle, advocated for many centuries, claims that knowledge, in this instance identified as science and technology, is a component of national power. In the case of the SSP, the advocates argue that domestically generated S&T knowledge can be translated into national power and international influence. The idea of knowledge equaling power is central to the bridging of domestic and foreign policy as seen in the SSP. In order to secure the continuance of American power and influence, advocates argue that it is essential that the country invest in all facets of S&T.

S&T are desirable not only for their immediate material impact on economics and security, but also for their symbolic value.[18] However, besides romantic ideals, space advocates make materialistic claims. An important theme in the SSP literature is that space activities have significant economic, political, and social implications for exploring countries. Such claims draw on broader beliefs about science and technology as sources of national power.[19] Space activists claim the benefits of the space program rival the influence Columbus' voyages had on Spain. It is claimed that the long-term benefits are greater than contemporary costs. The reach into space is described an investment in the future of society. The benefits are often unforeseen and too important to miss; it is therefore irresponsible to wait.

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[18] Ralph Sanders, *International Dynamics of Technology*. Vol. 87 Contributions in Political Science, ed. Bernard K. Johnpoll. (Westport (Connecticut): Greenwood Press, 1983). Eugene B. Skolnikoff. *Science, Technology and American Foreign Policy*. (Cambridge (Massachusetts): MIT Press, 1967).

[19] See, B.K. Blout, "Science as a Factor in International Relations." *International Affairs* 33 (January 1957): 71-8; Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress*. (New York: Oxford University Press, 1990); Jean-Jacques Servan-Schreiber, *The American Challenge*. New York: Anthenum, 1968; Walter Wriston, "Technology and Sovereignty," *Foreign Affairs* (Winter 1988/1989): 63-75.

There is a fairly constant sub-text regarding the settlement of space as a near- or long-term goal. A human mission to Mars remains a constant, if elusive, goal in the space community. The Space Station has been promoted as a step in that direction, just as the Shuttle was presented as the next stage in routine space flight. Whether the idea of manifest destiny in space is rhetoric or an actual ideology held by a substantial number of space policy actors is more difficult to determine. When asked, former NASA officials, including James Beggs, Hans Mark, and Richard Truly all expressed a belief that the expansion of civilization into space was probable, though most likely only in the distant future.[20]

Space Colonization: Ideology or Strategy?

NASA can be seen as relatively unsuccessful in advancing space colonization as a policy, if it can be taken at face value. As a political strategy, it has not proven very effective, although the idea remains a part of the NASA lexicon. As there have been no crewed space missions outside Earth orbit since 1972, it may be asked whether this form of argumentation is desirable. The US space program itself has often appeared to be in turmoil or confusion and colonization has not proven to be a politically viable mission.[21] While the

[20] Interviews With James Beggs, 22 July 1999; Hans Mark, 23 January 1998; Richard Truly, 4 September 1998.
[21] Kay, 1995.

language and ideology that evolved in the Apollo era remains at the core of the policy discourse today, that program was downsized and its technology base eventually abandoned. Even the Apollo program owed its success less to a desire by Kennedy to conquer space, than to short-term political expediency.[22] The ambitious post-Apollo plan of the late 1960s and the equally ambitious SEI failed to gain sustained political support. Programs claiming greater economic or military benefit have done somewhat better: the Space Shuttle continues to fly and the Space Station has won sufficient support, despite a limited range of missions and high costs. Talk about missions to Mars has proved to be less effective in winning political support for NASA than overtly linking the program to aerospace jobs or technology development. The grander aspects of manifest destiny may actually harm the space program's political standing among all but the most supportive political leaders. Near cancellation of the SSP in 1993 indicates that political support for space programs with fuzzy goals is fragile.

These beliefs about the future of space flight have policy relevance, especially in the promotion of the space program as a national asset and in the value placed on human space flight. Space activities are defined as a means of national power that requires that the US continue to push the technological envelope. International competition in space provides the basis of subsequent aspects of the ideology. Deterministic claims about the importance of space for the future of Humanity demand action. The commercial, technological, and military threats from other states demand a vigorous response aiming at American leadership. The long-term pursuit of space colonization also requires an American presence in space, despite cost and risk. Human space flight requires research into space medicine, which in turn is used as a justification for human space flight. A policy of human space flight is needed to operationalize the dream of colonization.

Ultimately, the veracity of such statements cannot be evaluated. However, constant references to space colonization and far ranging exploration cannot be dismissed entirely. The intellectual superstructure exists, reinforced by science fiction literature, the writings of scientists, and borrowed historical images. Whether rhetoric or agenda, the idea that Humanity will permanently inhabit space has become integral to the SSP. Therefore, the colonization idea remains important to understanding the public justification for large space projects like the SSP. The reality may not be achievable, but the idea itself has power and will likely recur in future discourse.

Future Research

Beyond the SSP, the theoretical issues discussed here may be applied to other cases of foreign-domestic policy overlap. Several other cases of policy

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[22] John M. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest.*

making in the US show signs of a foreign policy connection, either in conception, implementation, or justification.

National Defense Education Act

Perhaps the best such case is the National Defense Education Act (NDEA) of 1958. The NDEA, discussed briefly in Chapter 2, represented a major shift in federal education policy. For the first time, the federal government directed money towards secondary and university education. The motivation for this change, as chronicled by Clowse (1981), was the Cold War space race with the Soviet Union.[23] The launch of *Sputnik* was seized by advocates of reform and federal involvement in education as a rationale for change. The legislative act itself was justified on the basis of a "national emergency."

The model developed here would illustrate that foreign threat can be effectively used as a justification for a new policy action within a country. There had been almost no federal role in education prior to 1957 and attempts to bring the federal government into this policy area had not been successful prior to the *Sputnik* "crisis." An outside threat in this case was used to elevate a policy area to the level of national security, increase its value, and attract new supporters.

(Cambridge (Massachusetts): MIT Press, 1970).

[23] Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and the National Defense Education Act of 1958*. (Westport (Connecticut): Greenwood Press, 1981).

The National Highway Act

A second case that may be examined using this model is the National Highway Act (NHA) of 1956. The construction of the national highway system was the largest peacetime project ever attempted by the US government. The NHA was another federal foray into what was previously a state and local issue that was elevated to a national security issue. The scale and impact was essential multi-generational, as the highway system continues to evolve today. The economic importance of the system is incalculable. Federal highway funding was less controversial than federal aid for education because regulation and promotion of interstate commerce was a traditional federal activity. However, even a project with a fairly clear constitutional justification (the promotion and regulation of interstate commerce) and clear economic objectives employed national defense and security as additional justifications. The language of national security was used in the highway project and the highway system itself was known as the "national defense highway system."

Parallels to the SSP that appear in the Highway Act include the diversity of justifications and the high cost of the highway program. The NHA could be examined as a government program whose justification was over-determined. National security was not central to the NHA or its promotional discourse, but did provide an additional source of justification to help ensure passage. It is good case of non-reflective use of Cold War language in a political culture dominated by Cold war rhetoric.

The Supercollider Project

An additional case that could be examined with the model developed here is the Superconducting Supercollider (SCSC) project. The SCSC was in some respects the "poor relation" of the SSP. A large, expensive project pursued in the 1980s and 1990s, the SCSC was another example of "big science." However, the Supercollider did not survive the financial contractions of the early 1990s. Supporters of the project were unable to convince political leaders of the merits of the project. This project was canceled in 1993 after years of planning and development. Promoters tried to warn of loss of scientific brainpower and prestige should the project be canceled but without success. A similar European project was identified as competitive system.

Examining the SCSC there are numerous similarity to the Space Station, including public apathy about its arcane science. The SCSC could be examined using the importation model introduced in Chapter 8. It could also be asked as to why the SCSC failed while the SSP survived. A possible answer may lay in the mix of rationales offered for the SSP compared to the SCSC.

Educational Reform

A final case that is appropriate for further study is education reform. Comparative educational statistics are often used to critique the US educational system for its failure to teach certain subjects effectively. The debate over education policy in the US is definite domestic policy, one largely conducted at the state and local level. However, a comparative approach is sometimes taken. The link between education and trade competitiveness is drawn by comparing reading levels by grade or hours of homework between the United States and its major economic rivals. The US is compared to other countries, particularly the other industrialized democracies. Trading rivals, Japan and Germany, are especially relevant, as American youth will be competing globally with their opposite numbers in those countries.

Additional cases such as these will further illustrate the essential unity of foreign and domestic policy-making, as well as provide additional insight into how ideas migrate between these two policy worlds. The SSP and this study are a first step in this direction and it is hoped that further studies will improve our understanding of the interplay between ideas and policy, in different places and times.

Journey's End: What The Space Station Tells Us

Through the course of this study many issues regarding policy, power, and ideology have been examined. While it has proven difficult to disentangle many of these factors from each other, certain conclusions may be drawn. The case of the Space Station is a valuable lesson in politics and policy-making, particularly for the United States but also for international cooperation. It serves as proof of the power of ideas and words in the shaping of decisions. The power of the *idea* sustained the SSP and its many supporters for years despite set backs and opposition. These many ideas (knowledge equaling power, space as the next frontier, and America as world leader) are at the core of the Space Station Project and any other large, complex endeavor. Politics is largely the expression, propagation, and institutionalization of the products of the human mind.

The SSP case also demonstrates that ideas do not respect frontiers or organizational charts. There is a fundamental unity to political, economic, and social life that defies categories and labels, no matter how carefully crafted those designations may be. In fact, ideas may migrate far from their point of origin or creation. The SSP is therefore also a lesson in the *application* of ideas and images to new and often unexpected territory. It is also a demonstration of adaptability, and the ability of policy-makers to reinvent policies as situations warrant. Political ideas and policies cannot be rigid or unchanging if they are to have any lasting significance.

In the future, the International Space Station may provide many or few of the wonders promised by its advocates. As each few months bring additional components into orbit, the prospects for scientific discovery (and tragedy) increase. The scale of the SSP is unprecedented and may be remembered as a new transcontinental railroad, or a new *Titanic*. Its fate is also not entirely in the hands of its managers or crew. As the world itself continues to evolve, the partnerships forged over the past decade and a half may not survive. What happens in space after the Space Station reaches the end of its operation life is also unknown.

Regardless of its future, the SSP remains a fascinating example of a fundamental dilemma of politics: competition and cooperation. Neither can be banished from the human world, nor would it be desirable for them to be. It is the dance of these two impulses that create and sustain the most interesting and important elements of society. Politics is merely an outgrowth of those forces that shape all levels of society: local, national, and global. Conflict and amity co-exist in strange and unpredictable ways. The SSP is a prime example of how these forces may, on occasion, interact to produce something truly extraordinary.

APPENDIX ONE

METHODOLOGICAL ESSAY

Research Questions and Purpose

This study has been guided by a quest to understand how foreign policy and ideas of national power intersect with science and technology policy, specifically US space policy. The practical goal of this research has been to identify the major arguments given in favor of the Space Station Project and to track how those arguments changed over time and how different arguments appeared at different times.

To review from Chapter 1, this research has been guided by the following questions:

1) What US foreign policy objectives have been cited as justifications for the SSP and related US space policies and programs? More broadly, how have foreign and domestic policy interacted in the US space program?
2) How have national security and national power considerations shaped and permeated the political discourse about space policy? How is space linked to ideas of national power and security?
3) Is there an ideology about space that can be gleaned from official statements on space, and how it relates to the use of foreign policy agendas in space policy?

Data Collection

To answer these questions this study has examined the representation of the SSP in the space policy discourse. As this study has defined it, the space policy discourse includes the published and verbal record of the key space policy-making bodies: NASA, the Executive Branch (the President and Vice President), House and Senate oversight and appropriations committees. Because this is a diverse policy circle, evidence has been drawn from several sources.

Textual Sources

General Sources

For general historical information, several academic histories and articles have been consulted. Works by Goldman, Launius, Logsdon, McCurdy, and McDougall were the most important for establishing the history of the US space program, NASA, and individual projects (see Chapter 2).[1] Newspapers of record, *The New York Times* and *The Washington Post*, have also been used to establish the chronology. The Cable News Network Internet site CNN.COM has also been used as a media source.

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[1] Nathan C. Goldman, *Space Policy: An Introduction* (Ames (Iowa): Iowa State University Press, 1992);
Roger Launius and Howard McCurdy, *Spaceflight and the Myth of Presidential Leadership* (Urbana (Illinois): University Illinois Press, 1997); Roger D. Launius, *NASA: A History of the US Civil Space Program* (Malabar (Florida): Kreiger, 1994); John Logsdon, *Together in Orbit: The Origins of International Cooperation in Space Station Freedom,* Monograph in Aerospace History #11 (Washington: NASA History Division, 1991); John Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge (Massachusetts): MIT Press, 1970); Howard McCurdy, *The Space Station Decision: Incremental Politics and Technological Change* (Baltimore: Johns Hopkins University Press, 1990); McCurdy, Howard. *Inside NASA.* Baltimore: Johns Hopkins University Press, 1994;
Howard McCurdy, *Space and the American Imagination* (Washington: Smithsonian Institution, 1997); Walter A. McDougall, *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, Inc., 1985).

Two specialized periodicals were also used extensively. *Space News*, a weekly publication, includes specialized articles, interviews, and opinion pieces. It is also a forum for political, economic, and business actors concerned with space issues. The second specialized periodical is the magazine *Aviation Week and Space Technology* (AWST). ASWT, often referred to in aerospace circles as "aviation leak," is well known in the aerospace field as a source of current policy, technical, and occasionally classified information. AWST has regular analyses of NASA budgets and technology programs. Articles from AWST have been used to develop the Space Station Program chronology and to establish the historical context of the project. Comments by officials (named and unnamed) quoted in AWST have been used as data for the analysis section, though identified as originating from this source.

International agreements (MOUs, IGAs, joint statements, and other documents) have also been used as a record of the results of international negotiations and as formal statements of policy and technical architecture. Reports of special commissions of panels have also been consulted, primarily for their historical value as expositions of US space policy at a particular time.

NASA documents and publications contain of great deal of historical information that has been used to establish the project chronology. Newsletters and press releases have been particularly useful in this context, especially when in conjunction with independent sources such as AWST. One important source deserves special mention. NASA produced *International Space Station Fact Books* (1994 to 1999) and *Space Station Media Handbooks* (1989, 1992) represent a synthesized version of the justifications, proposed missions, and technical information about the SSP. They are laid out in a simple format and provide basic definitions of terms and concepts. They are primarily intended for use by the media and contain the essential facts and fact-claims that NASA wishes presented to the public.

Congressional and Executive Branch Material

Congressional hearings provided evidence of the interaction between NASA and Congress, and to a lesser extent, the role of other government bodies. Hearings have been examined to identify the arguments made by NASA witnesses, members of Congress, and non-NASA witnesses. In total, 130 hearings covered space issues between 1980 and 1998. Twenty eight have been examined in detail as they primarily address or relate to the SSP. Hearings during three key junctions in the Space Station's history are particularly important to determining the impact of particular arguments. The key periods in the history of the SSP are: the 1984 start of the project, the budgetary and design problems of the late 1980's and the 1993-4 inclusion of Russia. These key periods were the starting point of the data analysis and the development of the project chronology.

Executive branch documents are primarily focused on the President, the Vice President and the Department of Defense. Statements and speeches by the President and other key executive branch officials have been used as further evidence of how SSP has been described publicly. Speeches are in a variety of forums and audiences and may be very formal addresses or informal responses to press conference questions. The context of the comments, when relevant, has been taken into account. Policy statements and internal documents have also been used when available.

NASA Documents

The NASA material discussed in this study was drawn primarily from library collections and the NASA History Office files in Washington, DC. The NASA History Office has an extensive collection of technical and policy documents and a comprehensive collection of NASA publications. The document files are not limited to NASA but include White House, Executive Branch and Congressional texts. For the purposes of this study, the material is divided into four categories: publications, speeches, internal documents, and communicative documents. Texts are regarded as having been agency-authored if no specific author is given.

NASA publications are defined as the books, booklets, web pages, and reports published by the agency. These are usually promotional or educational in nature, designed to set forth NASA's activities to the general public and to specialized readers. Documents that are primarily technical in nature have also been cited when relevant. Publications are treated as official statements of NASA policies and program. The majority of speeches are by NASA Administrators but some are by other officials. NASA publications provided a rich vein of information about the SSP and other related space projects. The value of this material is that it represents both a promotional literature and part of the "inner dialogue" of the space advocacy community. This material has been used as texts for the analysis phase of the research and also to established the project's chronology.

Internal documents are memoranda, letters, briefing notes/books, and planning documents not intended for public release. Internal documents have been used to establish agency positions and strategy. They have been useful in establishing the technical issues related to the SSP and the major actors at each stage of the project. To a lesser extent, they have been used as texts to identify the arguments.

Communicative documents are similar documents that are transmitted to or from other agencies or actors. These documents have been used to establish the relationship between NASA and other parts of government, especially the Department of Defense. They have also been used as texts to identify the arguments in favor of the SSP. Internal and communicative documents have been used when they are available to highlight the development of the SSP. The availability of these documents has been greater for the earlier period. Fewer were available from the Clinton Administration.

Additional Texts in Analysis

Secondary sources have been used to supplement the primary documents. The most important secondary source is *Aviation Week* magazine. AWST is also a means by which aerospace officials can signal each other about policies or disputes, much as diplomatic or political actors signal each other via the mainstream media. Because of the access provided to AWST writers, comments by deceased or unavailable individuals are available from this source.

Interviews

Interviews With Author

Interviews conducted by the author have been used in three ways. First, the subjects provided a great deal of inside information about policy making for the SSP and the interaction between NASA and other actors. This was used extensively in the development of the project history in Chapter 5. Second, the responses of the subjects regarding the uses and value of the Space Station have been used as data for the analysis. Third, subjects have been asked to recommend additional subjects or issue topics. When relevant and available, these lines of research have been pursued by the author.

Interviews were conducted in person or by phone. Interviews ranged from 20 to 90 minutes and were structured loosely. There were specific questions asked, but subjects were encouraged to speak freely about their experiences and opinions about the SSP and the space program. Subjects were chosen for their importance in the policy-making process, their role in key decision making bodies, participation in Congressional hearings, and suggestions from other interview subjects. Interview subjects could speak on or off the record, in part or in full.

Although each interview was to some degree unique, depending on the individual's role, the time period in which they were active, and the time limits imposed on the interview. The primary questions asked in each interview related to the foreign policy dimensions of the SSP, the role of the international partners and how foreign policy and space policy interact. A focus for many interviews was the relationship between NASA and other actors within the American government and with the international partners. Figure A1.1 reproduces the question guide sheet used in the first interview conducted.

Figure A1.1. Notes For Interview With Hans Mark

Interview with Hans Mark 23 January 1998

Goals of Interview: Identify the following: What foreign policy interests were linked to the Station? How seriously did the supporters of the Station take these interest links? Who initiated the use of these linkages? How important were the foreign policy arguments?
[Foreign policy includes: national power, alliance cohesion, compete with USSR, economic competitiveness, national prestige.]

1) In the lead up to 1984, were foreign policy objectives being used to build support for the Station?

⇒ The idea of international participation. You mentioned it came from the White House. Could speak about this?

→ How important was the foreign policy element in the thinking at NASA?

→ How was it used in talks with other government offices, and in discussions with members of Congress

⇒ I suppose you could look at cooperation two ways: working together for a mutual benefit or combining against an outside element.
Was cooperation in the SSP mainly for competing with the Soviets (alliance cohesion, U.S. leadership) or cooperating with allies (shared cost, cooperation as a goal).

2) When the Station faced budgetary and design problems later on, between 1985-88, were foreign policy goals used to defend the Station?

⇒ In your opinion, were they important in helping the Station project survive?

3) Consider the process that led to the inclusion of Russia in the project (1992-4). What U.S. foreign policy interests were identified as benefiting from the SSP during this time?

⇒In an earlier conversation you cast doubt on the credibility of the arms control interest. Could you speak about this?

→ In this case, should cooperation with Russia (or others) be best seen as a means or an end?

Third Party Interviews

This study has also taken advantage of interviews conducted by third parties. These interviews are of two types. The first are the non-published interviews conducted by NASA History Office researchers. These have been used primarily in the development of the chronology, as the research agenda of the interviewers focused on the management and technical experiences of NASA officials. These interviews were also conducted near or after the subjects left government service and consist of their reflections on their experience. Second are interviews published in journals and magazines. These have been treated as public statements by the interview subjects and analyzed in the same fashion as the other texts. This is because these interviews were with sitting officials commenting in public about policy and plans.

Analysis

The development of the coding scheme was carried out in concert with the development of the project chronology and review of the technical data. The objective was to identify the specific arguments in favor of the SSP, the missions or purposes of the SSP, and why the speaker/writer said the SSP is important for the US or the world.

To analyze this data the procedure was followed:

1) Reading of secondary material to establish the context of the case and to help develop research questions. The key project actors and issues were identified during this phase.
2) Collection and reading of primary documents. During this phase interviews were conducted with the key players in the SSP. Identification of the major arguments used to promote the SSP was begun.
3) Development of the typologies of arguments.
4) Coding of documents.
5) Revision of typologies in light of documentary and interview data.

Figures A1.2 to A1.4 reproduce the coding guide lines used in the analysis of the documents. "Key Words" represent the terms that were typically sought, although specific word counts were not conducted. "Formulations" refers to typical sentence or paragraph length formulations that were expected. These key words and formulations were adjusted after several documents were coded to take into account new concepts not previously considered. The original coding was thereafter repeated. Documents were coded randomly to avoid the historical evolution influencing the coding scheme. The guidelines and the typologies were modified at each phase of the analysis. This was done to take into account differences between arguments within an existing typology. For example, the original typology system joined national prestige and national pride into a single category. Although these concepts are often joined in the written discourse, they represent different levels of policy (foreign verses domestic) and have different target audiences: prestige directed towards foreign actors and pride directed towards the American public. Likewise, science and technology have been combined from the original typology system as they both are research activities and the Space Station facilities are intended to serve both activities.

Figure A1.2 represents guidelines used for Chapter 6, which addresses the domestic level arguments used to promote the SSP. For Chapter 7, separate analyses were used depending on the time frame of the text. The argument typologies reflect the Cold War/post Cold War transition as discussed in Chapters 4 and 5. Other arguments were used consistently across time and these required a third typology.

There is a certain degree of overlap in some of the categories and some of the same key words appear in different typologies. This is because the arguments are related. In such cases, the context (year, forum, and the theme of the document) has been taken into account.

Figure A1.2. Coding Guidelines For Chapter Six

Research *Keywords:* Science; Research; Technology; Knowledge; Observatory; Laboratory. *Formulations:* Descriptions of specific scientific activities or experiments planned or projected. The SSP as a site for research or discovery.
Infrastructure *Keywords:* Experience; Exploration; Routine; Maintenance; Servicing; Repair; Long-Term; Next Step; Working in Space. *Formulations:* Past space projects and the sequential nature of the program. The SSP as part of planned or possible space missions.
Economic Stimulant *Keywords:* Commercial; Competitiveness; Investment; Pay-off; Spin-off; Dividends; Profit; Jobs; Emerging Technology; Industrial Return. *Formulations:* Descriptions of specific spin-offs of technology from space to other fields. Claims about the economic value of space activities.
Social Benefits *Keywords:* Future (of Society); Pride; Nation's Ability; Symbol; Future Generations; Greatness; Education; Youth; Confidence; Inspire. *Formulations* Claims about the ability of space to positively influence society. The SSP as encouraging science and technology education and research The SSP as enhancing Americans sense of national pride.
Analogies *Keywords:* Exploration; Pioneering; Frontier. *Formulations:* Comparing the SSP or NASA to Columbus, other historical explorers, or pioneers of aviation. Linking or comparing historical events to the SSP.

Figure A1.3. Coding Guide Lines For Chapter Seven Arguments Used Across Time

ACROSS TIME
Leadership *Keywords* Leadership; Maintain; First Rate; Symbol (of US leadership); Relinquish (status or ability). *Formulations* Space is a competitive place. The US needs to ensure its leadership in space.
International Competition *Keywords* Inevitability; Threat; Competitor(s); Rival(s); Challenge (from other states); Abandon (ability or role); Fall Behind (other states). *Formulations* References to specific nation states active in space as US competitors or rivals. Claims that space utilization are inevitable.
Economic Competition *Keywords* Competitiveness; Trade; Global Market; Globalization. *Formulations* References to specific economic competitors of the US and their space activities. Claims that the SSP is valuable for US competitiveness.
Prestige *Keywords* Esteem; Vitality; Greatness; Confidence; Symbol (of US power); Power; Determination. *Formulations* Claims that space activities create American prestige in other countries.
National Reputation *Keywords* Keeping Word; Promise; Commitment; Good Partner. *Formulations* Statements of the need to follow through on national commitments. Claims as to the loss of reputation if the project was delayed/canceled.
International Cooperation *Keywords* International; Global; Humanity/Mankind; Mutual; Work Together; Agreement. *Formulations* Claims that space activities are symbols of international understanding. Claims that space cooperation enhances peace or international understanding.

Figure A1.4. Coding Guide Lines For Chapter Seven
Time Specific Arguments

COLD WAR (1980-1990)
Competition With the Soviet Union *Keywords* Challenge (from Soviet Union); *Salyut*; *Mir*; Space Race. *Formulations* References to the Soviet Union's activities in space, especially space stations. Claims that Soviet space activities are military in nature.
Western Cooperation *Keywords* Free World; Allies; Western World; Friends; Freedom; Democracies. *Formulations* References to the partners as US military/political allies or fellow democracies. Claims that the SSP is an asset/symbol for the Western alliance.
Military Uses *Keywords* Security; Reconnaissance; Intelligence. *Formulations* To the Department of Defense and the availability of the SSP for military missions. Claim that military uses of the SSP are peaceful purposes.
POST COLD WAR (1991-1998)
New Relationship With Russia *Keywords* Opportunities; New Chapter; Integrate; New Era of History. *Formulations* The end of the Cold War is a new phase in the relationship between the superpowers.
Democratization *Keywords* Democracy; Free Market. *Formulations* To facilitating Russian democracy and its transition to capitalism.
Non-Proliferation *Keywords* Arms Control; Civilian Technology; Ensure Peaceful Pursuits. *Formulations* Need to ensure the Russian scientific establishment is employed in peaceful pursuits. Avoid the migration of Russian scientists.

APPENDIX TWO

GLOSSARY OF TERMS

ALPHA: Designation for a Space Station design that was adopted in 1993 and later merged into the ISS design. "Alpha" was also used as the call sign for the ISS during Expeditions One and Two.

APOLLO: Series of three-seat American spacecraft. Developed for the Lunar missions and later used in the Skylab and Apollo-Soyuz projects.

APOLLO-SOYUZ TEST PROJECT: The first joint space mission between the US and the Soviet Union, conducted in July 1975.

ARIANE ("Ariadne"): Series of European rocket vehicles launched from South America. *Ariane* is a major provider of launch services. *Ariane* is marketed and launched by Arianespace, a company incorporated in France.

COLUMBUS: Pressurized laboratory module developed by ESA for the Space Station.

CREW RETURN VEHICLE: A spacecraft used by crew members to return to Earth. Crew return vehicles may be used as transport into space or for an emergency return to Earth.

CRITICAL PATH: NASA term for a component of a spacecraft essential for mission success or safety.

DESTINY: American laboratory module for the ISS. Deployed in February 2001.

DUEL KEEL: Term for a Space Station design adopted in the mid-1980s. The Dual Keel consisted of a long horizontal truss with two cross beams. A later, smaller version was designated the Revised Base Line (see Chapter 5).

EXPEDITION ONE: The first permanent crew to inhabit the ISS, between November 2000 and March 2001. They were succeeded by the Expedition Two crew.

EXPENDABLE LAUNCH VEHICLE (ELV): A rocket vehicle designed for a single mission and then discarded.

EXTRA-VEHICULAR ACTIVITY (EVA): "Space walking." When an astronaut or cosmonaut leaves a space vehicle to work outside.

FREEDOM: The name given to the Space Station in 1988 by President Reagan. The name was retained until about 1993 when it fell out of use.

GEMINI: Series of two-seat American spacecraft used to develop and test orbital maneuvering, rendezvous, extra-vehicular activity, and long-duration flight.

GEOSYNCHRONOUS ORBIT: An orbit that matches the rotational speed of the earth, about 35,700km (22,300 miles) in altitude. In such an orbit, widely used by communication satellites, a spacecraft remains over a single point on the earth's surface.

HABITATION MODULE: US-built Space Station module that will provide sleeping and living facilities for the Station crew. As of April 2001, future funding for the module is uncertain.

HUBBLE SPACE TELESCOPE: Orbital telescope launched in 1990 from the space shuttle *Discovery*. *Hubble's* early operations were hampered by a flaw in its main mirror. Although later corrected, the *Hubble*'s difficulties symbolized for many the problems at NASA in the early 1990s.

INTERNATIONAL SPACE STATION (ISS): Current name of the Space Station Project. The ISS currently involves 16 countries. When complete, the ISS will consist of several laboratory, habitation, and support modules and will house a crew of 4-6.

KIBO ("Hope"): The name of the Japanese Experimental Module (JEM). It consists of a large pressurized laboratory module, a logistics module, and an exposed experiment platform.

LUNAR MODULE: Two-person spacecraft designed to land on the Moon.

MERCURY: Series of one-seat American spacecraft that constituted the first phase of the US piloted space program.

MIR ("Peace"): Soviet/Russian space station. Launched in 1986, it housed numerous cosmonauts and astronauts from over a dozen countries. *Mir* reentered the earth's atmosphere in March 2001.

MODULE: A self-contained spacecraft component.

NODE: One of a series of Space Station modules that link pressurized modules to provide storage and equipment space.

ORBITAL INCLINATION: The angle at which a spacecraft orbit crosses Earth's equator. Inclination determines how far north and south a satellite's ground track goes.

POWER TOWER: Space Station design concept consisting of modules mounted on a single truss (see Chapter 5).

PROGRESS: Series of robotic resupply vehicles developed by the Soviet Union to service the *Salyut* and *Mir* space stations and later used with the ISS.

PROTON: Series of Soviet/Russian launch vehicles, first used in 1965.

REVISED BASE LINE: See DUAL KEEL.

SALYUT ("Salute"): A series of seven Soviet space stations launched and occupied between 1971 and 1986.

SATELLITE: An object that orbits another object in space. More specifically, an artificial device (usually unpiloted) placed in Earth orbit.

SATURN: A series of large launchers used to place Apollo spacecraft in orbit.

SKYLAB: American space station launched in 1973 and used by three separate crews until 1974. It reentered the Earth's atmosphere in 1979.

SOYUZ ("Union"): Series of two and three-seat Soviet spacecraft first used in 1967. A modified *Soyuz* serves as the interim crew return vehicle for the ISS.

SPACELAB: European-built modular laboratory that was flown on sixteen Space Shuttle missions.

SPACE SHUTTLE: 1. The Space Transportation System (STS). American spacecraft system developed in the 1970s and consisting of a fully reusable orbiter, two reusable solid rocket boosters and an expendable fuel tank. 2. The *Buran.* A reusable Soviet spacecraft launched by a large expendable booster.

SPACE STATION: A spacecraft or facility that orbits the Earth in a long-term or permanent orbit.

SPIN-OFF: Application of a scientific or technological development to another field.

SPUTNIK ("Fellow Traveler"): The first artificial satellite, launched by the USSR on 4 October 1957.

TRANSFER VEHICLE: A spacecraft designed to resupply and refuel the Space Station. Two such vehicles are under development, the ATV in Europe and the HTV in Japan. The Russian Progress spacecraft also serves this role.

UNITY: American-built ISS module, launched in June 1999. Also known as "Node One."

UTILIZATION: The use of space or spacecraft for practical purposes such as weather forecasting.

VOSTOK ("East"): Series of single seat Soviet spacecraft. *Vostok I* (call sign, "Swallow") launched the first man (Yuri Gagarin) into space in 1961. *Vostok 6* ("Sea Gull") launched the first woman (Valentina Tereshkova) into space in 1963.

X-38: Crew return vehicle under development by the US, intended to eventually replace the *Soyuz* as the Space Station's crew return vehicle. As of April 2001, future funding for the vehicle is uncertain.

ZARYA ("Sunrise"): Russian-built Space Station module. Launched in 1998. Also known as the "Functional Cargo Block." It provides power, orbit reboost, and initial living quarters.

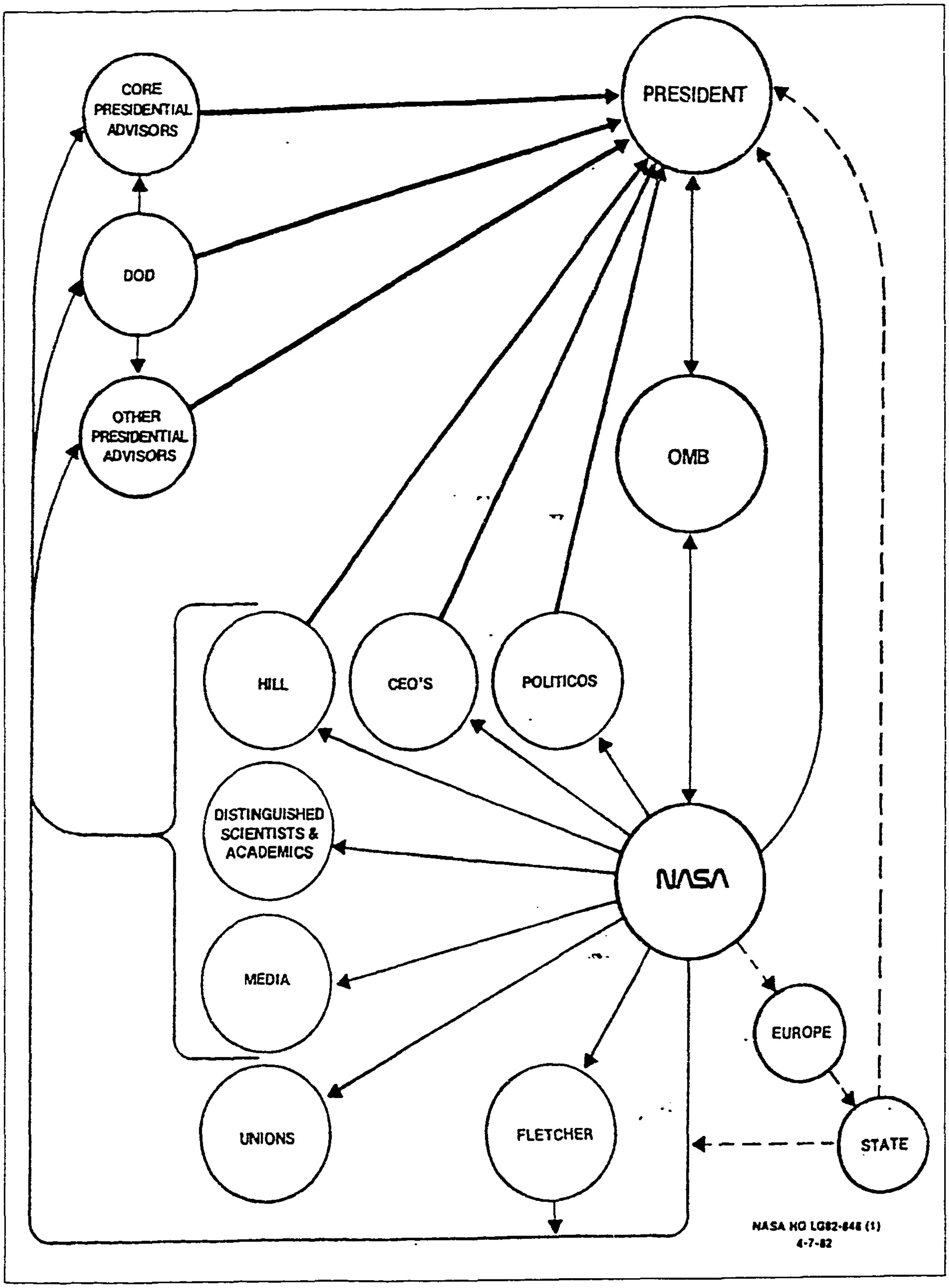
ZVEZDA ("Star"): Russian-built Space Station module designed to provide power, boost, and attitude control for the Station. Also known as the "Service Module."

APPENDIX THREE

NASA SPACE STATION STRATEGY DOCUMENT

This document, labeled NASA HQ LG82-846 (1), is dated 7 April 1982. It was included in as part of collection of notes outlining a "political strategy."[1] The chart is a typical NASA viewgraph, one of many used by the Agency in presentations within government and elsewhere. The lines represent paths of lobbying and influence radiating from NASA and all directed toward the president as chief decision-maker. It also reveals some of the allies that NASA hoped in 1982 to enlist for its cause.

[1] Untitled Attachment to Terence Finn, "Note to ADB/Mr. Culbertson," (Washington: NASA Historical Collection, 1982), NASA HQ LG82-846 (1).


CORE PRESIDENTIAL ADVISORS
PRESIDENT
DOD
OTHER PRESIDENTIAL ADVISORS
OMB
HILL
CEO'S
POLITICOS
DISTINGUISHED SCIENTISTS & ACADEMICS
NASA
MEDIA
EUROPE
UNIONS
FLETCHER
STATE
NASA HQ LG82-848 (1)
4-7-82

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Margaret Finarelli, 8 June 1998
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John Hodge, 4 June 1998
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Michael O'Brien, 3 August 1999
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Richard Truly, 4 September 1998

Frequently Used Internet Sites
NASA Headquarters: http://www.hq.nasa.gov/
NASA History Office: http://www.hq.nasa.gov/office/pao/History/history.html
NASA Homepage: http://www.nasa.gov/
NASA Human Spaceflight: http://spaceflight.nasa.gov/
NASA Shuttle Press Kit: http://www.shuttlepresskit.com/index.html
Thomas, US Library of Congress: http://rs9.loc.gov/home/thomas.html

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"Manifest Destiny in Space: Ideology, International Competition, and U.S. Policy." *Maxwell Review.* Volume 6 Number 1 (Spring 1998). Pages 28-37.
"Facing the Technology Gap: European Cooperation in Science and Technology." *Maxwell Review.* Volume 5 Number 1 (Spring 1997). Pages 4-32.

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"The Foreign Policy State and the Use of Foreign Policy to Promote Domestic Policy Change." American Political Science Association Conference. Atlanta, GA, 1-4 September 1999.
"Following the Flag: Linking Foreign and Domestic Policy in the Space Program." Northeastern Political Science Conference. Boston, MA, 12-14 November 1998.
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"The Role of Science and Technology in International Relations Theory and Practice." International Studies Association Midwest Conference. Cleveland, OH, 3-5 October 1997.
"Testing and Grading in the Social Sciences." Teaching Assistant Orientation, Syracuse University Teaching Assistant Program. Syracuse, NY, August 1997.

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Graduate Student Orientation, August 1996. Organized and moderated orientation for incoming Political Science graduate students.

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