U.S.-Japan Space Policy:
A Framework for 21st Century Cooperation

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July 2003

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Foreword

This project on the prospects and consequences for enhanced U.S.–Japan Strategic Cooperation in Space is the product of a rich, interdisciplinary research agenda undertaken by the International Security Program of the Center for Strategic and International Studies in Washington, D.C. over the last twelve months. While various aspects of enhanced cooperation between the United States and Japan have received considerable attention in recent years, there has been a conspicuous absence of analysis and commentary concerning the legacy of and possibilities for American and Japanese bilateral cooperation in space. At the onset of a new strategic era marked by profound international uncertainty, the United States and Japan now stand at a critical juncture in their bilateral relationship. While economic tensions and contrasting political agendas have marked much of the history of U.S.–Japan relations, the relationship has matured in recent years into a deep partnership that encompasses a wide range of global and regional issues. The trade frictions that poisoned the relationship in the 1980s and early 1990s have receded somewhat, and there is currently a more powerful sense of commitment in both capitals to help maintain a strong security alliance in an unexpectedly dangerous post-Cold War environment.

The way the United States and Japan interact in space is likely to be one of the more important, and indeed interesting, arenas for potential cooperation in the future. Space policy is truly multi-dimensional, and decisions regarding the allocation of resources, structure international cooperation agreements, and establishment of industry-wide standards touch on a number of crucial policy areas. Virtually every major step in space invariably affects the security, commerce, trade, science and information technology agendas of each nation.

Participants in this project have engaged in various aspects of space policy in their professional capacities, either while in government or when developing policy recommendations in the private sector. The participants themselves were drawn from a broad range of expert areas to bring contrasting perspectives into the analysis. The result, we hope, is a commonsense and coherent set of policy recommendations backed up by strong analysis of how the United States and Japan can achieve greater cooperation in space. There was a strong consensus about the need to revise the existing policy framework for affecting and implementing cooperation between the two great nations of the Pacific. With ongoing and growing concerns between the United States and Europe over the Galileo project, participants in this study were mindful of the need to challenge the current status quo for doing bilateral business in space.

We would like to thank a number of participants who provided insights, encouragement, or commentary in the production of this paper. Our gratitude goes to: William Breer, Jessica Cox, Kristina Chambers, Joe Dorfler, Robin Laird, James Lewis, Mary McCarthy, Carola McGiffert, Derek Mitchell, Kevin Nealer, Rick Nelson, Michael O'Hanlon, and Tsuneo Watanabe, who each provided invaluable comments both in person at brainstorming sessions and in extensive edits of working drafts. Christian Beckner receives enormous credit for his masterful handling of the tasks of principal author of the task force document,

as does Yuki Tatsumi, the project coordinator and translator of the report. Our thanks also go to ITOCHU, Boeing, Lockheed Martin, and Mitsubishi International for their support and interest in our effort.

While the CSIS team benefited enormously from the active support of this distinguished and diverse community of experts and commercial players, we take full responsibility for the intellectual product, ideas, and initiatives advanced in the Task Force report. It is our collective hope that in a small way these recommendations will help take U.S.–Japan cooperation in space to a higher level, literally.

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July 2003

List of Abbreviations

ASBC	Advanced Space Business Corporation
ADEOS	Advanced Earth Observing Satellite
C3I	Command, Control, Computer and Information
CIRO	Cabinet Information and Research Office of Japan
C/A	Coarse Acquisition (code)
CSTP	Council for Science and Technology Policy of Japan
DCI	Director for Central Intelligence
DOD	Department of Defense
EELV	Evolved Expendable Launch Vehicle
EOP	Executive Office of President
ESA	European Space Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GIS	Geographic Information Systems
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICBM	Inter-continental Ballistic Missile
IGS	Information-gathering Satellites
IGEB	Interagency GPS Executive Board
ISAS	Institute of Space and Aeronautical Science
JAXA	Japan Aerospace Exploration Agency
JDA	Japan Defense Agency
JDAM	Joint Direct Attack Munitions
JMSDF	Japan Maritime Self-Defense Force
JSDF	Japan Self-Defense Forces
MELCO	Mitsubishi Electric Corporation
MEO	medium-earth orbit
METI	Ministry of Economy, Trade and Industry of Japan
MEXT	Ministry of Education, Culture, Sport, Science and Technology of Japan
MFN	Most-favored Nation Status
MLIT	Ministry of Land, Infrastructure, and Transport of Japan
MPHPT	Ministry of Public Management, Home Affairs, Posts and Telecommunications of Japan
NAL	National Aeronautics Laboratory of Japan
NASA	National Aerospace Administration
NASDA	National Space Development Agency of Japan
NATO	North Atlantic Treaty Organization
NIMA	National Imaging and Mapping Agency
NOAA	National Oceanic --- Administration
NRO	National Reconnaissance Office
NSC	National Security Council
OSTP	Office of Science and Technology Policy
PCC	Policy Coordinating Committee

QZSS	Quasi-Zenith Satellite System
R&D	research and development
RLV	Reusable Launch Vehicle
RSC	Rocket System Corporation
SA	selective availability
SAC	Space Activities Commission of Japan
UAV	Unmanned Aerial Vehicle
U.S.	United States
USGS	U.S. Geological Service
WMD	weapons of mass destruction

I. Introduction

On March 28, 2003, as the world's attention focused on the war in Iraq, Japan quietly launched two information-gathering satellites (IGSs) into orbit. These two satellites were the first of their kind for Japan, and the launch was an inflection point for a nation whose laws and principles enshrined the idea that space was a place for peaceful, scientific pursuits—not military or intelligence activities. The event attracted little attention outside of Japan, but represented a significant step in the evolution of Japanese security policy. Ever since the wake-up call of August 1998, when North Korea launched a three-stage Taepodong-1 missile over Japan and into the Pacific Ocean, Japan's security outlook has been in transition, adjusting to the new threats to regional security and the broader global threats from rogue nations and terrorist organizations. Japan Maritime Self-Defense Force (JMSDF) vessels played a non-military role in the wars in Afghanistan and Iraq, re-supplying the U.S. Navy with fuel and water. And now Japan was launching satellites with reconnaissance capabilities that would allow it to independently monitor the unsettled situation on the Korean peninsula and other regional matters.

This recent launch is only the latest change in the context of U.S. and Japanese space policy. A number of other developments in the last five years have also altered the basis for their space policy relationship. The commercial market for space, seen as a strategic industry and engine of growth in the 1990s, has soured, particularly in the launch vehicle and communication satellite segments. A number of countries have developed or upgraded launch vehicle capabilities. Europe has decided to develop a new navigation satellite system, Galileo, as a potential competitor to the U.S.-built Global Positioning System (GPS). The wars in Afghanistan and Iraq validated the investments that the U.S. military had made in the past decade to integrate space systems into its war-fighting capabilities. The Koizumi government in Japan has taken a fresh look at the country's norms of security policy.

Collectively, these changes create a set of challenges and opportunities for the U.S.–Japan space policy relationship. Cooperation in this area has been strong since the 1970s, and the policy framework that governs the two countries' interactions on space policy has evolved in recent decades to reflect new realities. Today, the two countries find themselves at another turning point, prompting the need for a new review of the framework for U.S.–Japan space policy.

This paper provides a comprehensive and critical assessment of U.S.–Japan space policy. It describes the context for both countries' policies, assesses the choices that each face at present, and offers recommendations about what both countries can do to enhance cooperation and strengthen their respective national interests in space.

Chapter 1 looks at the background of U.S.–Japan space policy. It begins with an overview of the three key areas of space policy—science, commerce, and security—and looks closely at the basis for cooperation in each. It then examines the history of the U.S.–Japanese space policy relationship and the evolution of a bilateral framework to guide the relationship. It provides an overview of the key institutions in each country that have dominion over space

policy, and looks at recent changes within this institutional framework in each country. The chapter concludes with an examination of the key contextual factors that are reshaping the relationship, or have the potential to do so in the coming years.

Chapter 2 takes a closer look at three specific segments of space policy: launch vehicles, remote sensing, and navigation satellite systems. In each of these cases, policymakers are faced with trade-offs between two of the three key drivers of space policy—commerce and security—and sometimes face difficult decisions about relative priorities. These decisions become increasingly difficult in an international context. The chapter examines how the United States and Japan are interacting on these three areas, and the potential impact of their decisions on the broader relationship.

Chapter 3 examines the imperatives for and obstacles to cooperation in both the United States and Japan. It weighs the potential costs and benefits of cooperation in each country, and describes what each country would want from the other in a redefined bilateral relationship. It also looks at the various types of obstacles that both countries would have to overcome to achieve an optimal level of cooperation.

Chapter 4 concludes the report with a set of recommendations (both structural and substantive) for each country. These recommendations include an updated framework agreement for the space policy relationship and appropriate institutional reform in both countries to capture the benefits of cooperation.

Space policy is obviously only one of many issues that are important in the U.S.–Japan relationship today. Security concerns in East Asia occupy the attention of policymakers in both countries on a daily basis. The United States is focused on increasing Japan's operational and financial assistance for the wars in Afghanistan and Iraq. Both countries are paying new attention to protecting against terrorist threats and ensuring the security of the global supply chain. Economic issues between the world's two largest economies remain very important. Japan's current bout with deflation and the United States' slow recovery from recession are negatively impacting each other and the entire global economy. Other items on the bilateral agenda include trade negotiations, international development assistance, and global environmental issues.

This is a crowded plate, but space policy belongs as a key part of this agenda, because it *complements* and *reinforces* the key priorities of the relationship. The right bilateral space policy will lead to improved regional and international security, and have positive spillover effects on the two countries' economies. Strong ties in space policy can serve as a pillar of strength at times in the future when the relationship is under stress.

The strong relationship between the United States and Japan has proven its worth since the terrorist attacks of September 11th, and remains a bulwark of stability in the Asia–Pacific region. But the existence of good relations should not be cause for inaction in either country. Instead the two countries should use this period of time for renewal and extension in policy areas of growing importance. Space policy is one of these areas, and this report lays out a roadmap for U.S.–Japanese cooperation in the next decade.

II. U.S.–Japan Space Policy: Key Drivers, History, Institutions, and Context

1. Key Drivers of Space Policy

Space policy is a broad concept, and requires a clear definition at the outset. A general discussion of "space policy" applies a single label to a diverse set of objectives, institutions and systems. Before attempting a broader analysis of the U.S.–Japan space policy relationship, we first segment and filter space policy by its three key drivers: science, commerce, and security.

Science includes projects and initiatives intended to increase knowledge and expand mankind's reach, such as the International Space Station, Hubble Space Telescope and the Mars Pathfinder. It includes space-based systems that monitor the earth's environment, such as weather satellites. Science is the most cooperative arena within space policy, on a global scale—no less than 16 countries are partners in the deployment of the International Space Station.

Commerce is the second key driver of space policy. A range of industries utilize space-based communication, navigation, and information systems to deliver a long list of services. Many of these industries have been in poor shape over the last several years (most notably satellite-based telephony, which has stagnated since the Iridium debacle of 1999), but this has not diminished countries' positions that space can be a strategic commercial asset. Indeed, other space-related industries (such as geographic information systems (GIS)) remain relatively strong, and many policymakers still believe that space is a strategic industry—the kind that generates spillover technologies and benefits to the broader economy that are not captured by any standard estimate of market size. There are strong competitive pressures in the space industry, and national governments subsidize commercial space activities (directly or indirectly) in response to these pressures.

The third and final driver of space policy is security. The strategic importance of space from a military perspective has been evident since the days of Sputnik and the "space race" of the 1950s and 1960s. Both the United States and the Soviet Union used space to spy on each other, and developed inter-continental ballistic missiles (ICBMs) that could deliver their nuclear arsenals around the world. In the 1980s, President Reagan's "Star Wars" system was envisioned as a defensive shield in space to protect America against nuclear attack. The importance of security as a driver for space policy diminished after the end of the Cold War, but has reemerged as a major priority in recent years, in large part due to the role of space systems in the shift to network-centric warfare. For example, Joint Direct Attack Munitions (JDAMs) utilize calibration with Global Positioning System (GPS) satellite signals to hit military targets with an unprecedented level of accuracy, and at a cost that is a small fraction of other guided missile systems.

Very few projects in space are driven solely by one of these three drivers to the exclusion of the other two. Scientific projects are often intended to spark the creations of new technologies that will fuel commerce. Projects that are security-focused often create new commercial interests, and vice versa. It is this intersection of interests that makes the formation of national space policy a complicated (yet worthwhile) task, and bilateral or multilateral initiatives are respectively more difficult with each additional actor.

2. History

The story of the United States and Japanese interaction in the area of space policy over the last 35 years is one of competing desires. The United States has been torn between the desire to use space as a tool of alliance-building (especially during the Cold War) and the fear that too much generosity would decrease the effective 'return on investment' from its space-related research and development. Japan has wanted access to US technology, but not at the price of weakness and dependency. It has lurched back and forth between autonomous development (*kokusanka*) and cooperation. The result is a history that has had its share of difficulties, but never to the point where the basis of the overall relationship has been jeopardized. This section provides a brief examination of this history, focusing on the key topics, agreements, and points of decision that are relevant to the relationship today.

In the late 1950s and early 1960s, as the United States engaged in the space race with the Soviet Union and spent billions of dollars to put a man on the moon, Japan's space program was small and loosely coordinated. There was little interaction between the two countries in the area of space policy, but in the late 1960s, U.S. officials pushed to develop a relationship with Japan's space program, foreseeing that it would become a major player in the decades to come.[i]

In 1969, the two countries formalized their space policy relationship for the first time, in the *Exchange of Notes Concerning Cooperation in Space Exploration*. The agreement provided American industry with the permission to provide unclassified technology and equipment for the development of launch vehicles to the Japanese government and to Japanese firms under contract with the government. This agreement was reached in July 1969, the same month that Neil Armstrong and Buzz Aldrin walked on the moon and confirmed the ascendancy of America's role in space. Japan, by contrast, was an insignificant player at this time, content simply to receive transfers of technology from the United States and begin to catch up.

In February 1970, Japan successfully launched its first satellite (the Ohsumi). As the decade progressed, Japan licensed technology from the United States, following the terms of the 1969 Agreement, to develop new classes of launch vehicles ("N" and "Q"). These transfers of technology were not without controversy—objections were raised on the grounds of proliferation, given the dual-use nature of launch vehicle technology for ballistic missiles, and economic competitiveness. But the transfers continued and the two countries broadened their cooperation on a range of scientific projects in the late 1970s. Japan

decided not to partner with the United States in the development of the Space Shuttle in the 1970s, but reversed course and signed on as a partner in the planned Space Station in the early 1980s.

At the same time, the pattern of dependence and low-level cooperation began to break in the area of launch vehicle development. Japan developed the H-I rocket as an autonomous successor to the American-designed N-II, and began using it for launches in 1986. In 1984, Japan decided to develop the next-generation H-II autonomously, a launch vehicle that would have the capability to launch a two-ton payload to a geostationary orbit, rather than licensing existing technology from the United States. The development of this platform was costly and delayed, and when it finally debuted in the early 1990s, it was beset with a high failure rate. Japan moved on from these failures to develop the more reliable H-IIA, its current launch vehicle platform.

Satellite technology became another area of contention in space policy between the two countries in the 1980s, leading to the second major formal statement of the U.S.–Japan relationship: the 1990 *Exchange of Notes concerning the Policy and Procedure of R&D and Procurement of Artificial Satellites*. The economic relationship between the two countries was acrimonious in the late 1980s due to trade imbalances and suggestions of unfair competition, and the agreement reflects this state of discord. In the agreement, the Japanese government agreed to open up procurement of non-R&D satellites to foreign competition, and ensure that satellites would be purchased on an open, transparent, and non-discriminatory basis.[ii]

In the 1990s, the United States and Japan cooperated on a number of scientific projects in space. In 1994, the two countries partnered on the Advanced Earth Observing Satellite Program (ADEOS), a scientific remote-sensing system designed to acquire data on global environmental change. The International Space Station (now involving the Russians as a partner, not a competitor) came into existence with both U.S. and Japanese participation, and the 1998 *Memorandum of Understanding between the Government of Japan and the National Aeronautics and Space Administration of the United States of America Concerning Cooperation on the Civil International Space Station* codified their cooperation.

The two countries also concluded several minor space policy agreements during the decade. The 1995 *Agreement between the United States and Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes* dealt with a legal issue related to space policy but had no real impact on the substance of the relationship. In 1998, the two countries signed the *U.S.–Japan Joint Statement on GPS Cooperation*, confirming their intent to partner and ensure full compatibility for future satellite navigation systems.

These piecemeal agreements have served to manage particular issues in the relationship, but are insufficient to mediate potential disputes and address the common challenges that the two countries face in space policy. As discussed in Section 4 of this chapter, the context in which both countries evaluate priorities in space policy has changed significantly in the last few years, creating the need for a new, comprehensive framework for the relationship.

3. Institutions

Before examining the U.S.–Japan space policy relationship, it is necessary to look at the governing institutions in each country and the way in which national space policy is accordingly formulated. The two countries' institutional frameworks have evolved over the past forty years in reaction to changing realities in the space policy arena. The space policy frameworks in both countries are balkanized, with a broad set of actors in each country responsible for the disparate elements of space policy. These agencies and institutions have agendas that are narrower in scope than broader national interests, prompting both countries to have coordinating offices and mechanisms designed to arbitrate internal disputes. The report looks first at the United States, and then turns to Japan.

A. The United States

A broad set of agencies in the U.S. government has responsibility for space policy. The most significant of these in terms of budgetary power are the National Aeronautical and Space Administration (NASA) and the Department of Defense (DOD), collectively accounting for more than 90 percent of federal spending in space.[iii] In addition, a number of other departments and agencies have responsibility for space policy disproportionate to their budget authority.

NASA is the inheritor of America's historic space initiatives of the past 45 years, and remains the lead agency for civilian space projects in the United States. It is responsible today for the Space Shuttle program (grounded in early 2003 as a result of the Columbia disaster) and various scientifically-driven projects, such as the International Space Station, the Hubble Space Telescope and the several unmanned expeditions to Mars. In FY 2003, NASA's budget totaled $15.3 billion.[iv]

DOD plays an equally important if less publicly-visible role in space policy. DOD has leading responsibility for managing the United States' military and (with the Director of Central Intelligence (DCI)) intelligence roles in space, and its area of control overlaps into the civilian domain, for example, in its control and management of GPS. Within DOD, a broad swath of agencies have responsibility for space policy, including the U.S. Space Command, the space commands for the Army, Navy and Air Force (the latter of particular importance), the National Reconnaissance Office (NRO), the National Imagery and Mapping Agency (NIMA), and the Office of the Assistant Secretary of Defense for Networks and Information Integration (NII).[v]

A number of other agencies have responsibility for one or more key areas of space policy. The Department of Commerce has responsibility for the promotion of commercial space technology and weather-monitoring (the latter through its National Weather Service). The Department of State handles export control issues related to space technology, and has lead responsibility for the international dimensions of space policy. The Department of Transportation plays a coordinating role in the civilian use of GPS, and its Federal Aviation Administration (FAA) has regulatory authority for the commercial launch vehicle industry. The U.S. Geological Service (USGS) within the Department of the Interior has lead responsibility for the LANDSAT remote sensing satellites. The U.S. Department of Agriculture is an important user of government remote sensing satellites. The Federal

Communications Commission (FCC) has regulatory authority over the communications satellite industry. The National Science Foundation sponsors a number of scientific endeavors in space.[vi]

This alphabet soup of space policy is coordinated at two levels: at a lower level through a various interagency coordinating bodies and working groups, and at a higher level through the National Security Council (NSC) and the Office of Science and Technology Policy (OSTP) within the Executive Office of the President.

Standing organizations exist to manage certain aspects of interagency coordination, and in other cases this policy coordination is left to ad hoc working groups. An example of the former is the Interagency GPS Executive Board (IGEB), an independently-staffed government agency that both facilitates internal coordination of GPS-related policy, and creates a mechanism for international consultation on GPS issues that is not solely managed by DOD. An example of the latter is the Remote Sensing Interagency Working Group, which meets on a periodic basis to communicate interagency concerns, and is in place to resolve issues of lower-level concern.

At the highest levels of the U.S. government, space policy is coordinated by the NSC and the OSTP . These two offices within the White House share responsibility for the National Science and Technology Council and the National Space Council, two entities that are used on an ad hoc basis to manage space policy issues that merit senior-level attention and oversee broader reviews of national space policy.

This institutional structure is not static. Responsibility for export control shifted from the Department of State to the Department of Commerce during President Clinton's first term in office, and shifted back to the Department of State following the controversy in 1998 over the alleged transfer of sensitive missile technology to China during launch failure analysis. Space policy coordination within the DOD has been significantly restructured in the last two years, following many of the recommendations of the Space Policy Commission, which was chaired by Secretary Rumsfeld prior to his nomination as Secretary of Defense.[vii] The Bush Administration revived the space policy review process in June 2002, and established Policy Coordinating Committees (PCCs) to clarify national space policy and assess two specific issues: the private sector's role in remote sensing and space transportation policy.[viii]

B. Japan

Japan's institutional framework has fewer actors, but can be equally bewildering to the outside observer. The two long-standing agencies for space policy are the National Space Development Agency (NASDA) and the Institute of Space and Aeronautical Science (ISAS). NASDA (akin to NASA in the United States) is responsible for a broad set of civilian space activities, including the development of launch vehicles and Japan's participation in the International Space Station. It reports to several government ministries, including the Ministry of Education, Culture, Sports, Science and Technology (MEXT); the Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) and the Ministry of Land, Infrastructure and Transport (MLIT). Its budget was $1.3 billion in FY

2002.[ix] ISAS is controlled by MEXT and is the lead agency for space-related scientific research in Japan; its budget was $209.3 million in FY 2002.[x]

Other parts of the Japanese government have played an increasing role in space policy in the last decade. The Cabinet Office manages Japan's program to develop reconnaissance satellites, which was kept out of NASDA to allow it to maintain its peaceful mandate. The program's budget in 2002 was $548.4 million.[xi] The Ministry of Economy, Trade and Industry (METI) and MLIT both have space programs, budgeted at $89 million and $295.3 million respectively.[xii]

Until January 2001, the lead office for the formulation and development of space policy in the Japanese Government had been the Space Activities Commission (SAC). The SAC was folded into MEXT at that time, and a new entity—the Council for Science and Technology Policy (CSTP, formerly called the Science and Technology Council)—was established within the Cabinet Office to assume the lead role for policy formulation.[xiii] In September 2001, Prime Minister Koizumi charged the CSTP to develop a proposal to review and reform Japan's space-related institutions. In July 2002, the CSTP concluded this expert review, and focused its recommendations on institutional reform and reorientation toward security-related concerns. The panel reiterated earlier calls by Koizumi to merge NASDA, ISAS and the National Aeronautics Laboratory (NAL) into one super-agency. This process is underway, and the new agency will be officially established in late 2003, to be named the Japan Aerospace Exploration Agency (JAXA). But the merger is far from complete, and apprehension remains about the merger, particular within ISAS, which fears that its science-related agenda will be trampled by the much larger NASDA.

One institution whose role in space policy remains undeveloped is the Japan Defense Agency (JDA). Unlike its counterpart in the United States (DOD), it has no official role at present in space policy. It has leased satellite communications and purchased satellite imagery since the mid-1990s, but treaded lightly on the 1969 Diet Resolution barring non-peaceful uses of space by Japan (discussed in the next section).

4. Context

Before taking a closer look at the U.S.–Japan space policy in subsequent chapters, it is important to look at several external factors that have bearing (or could have bearing) on the relationship. Shifts in the two countries' security outlooks and space-related policies could have a significant effect on the priorities and assumptions that underlie any new framework for the U.S.–Japan space policy relationship.

The four key external factors are:

1. New threats and uncertainties in East Asian security
2. Shift in Japanese outlook on national security and use of force
3. Decisive role of space in American warfare during recent conflicts
4. Sensitivity to export control issues in the United States, particularly vis-à-vis China

We will examine each of these issues in turn.

A. New Threats and Uncertainties in East Asian security

The most important factor affecting the context for U.S.–Japan space policy is the evolution in the regional security environment over the past decade, particularly in the last 2–3 years. Two key sources of instability have heightened concern about security in the region: China's military build-up and confrontational stance toward Taiwan, and North Korea's efforts to develop or acquire weapons of mass destruction and ballistic missile capabilities. Because of these two developments, the United States has refocused its attention on East Asian security, even at a time when the primary focus of American security policy is the Middle East. At the same time, these developments have led Japan to develop a new awareness of the threats to its security and the need to play a more active role in ensuring regional security, and also a fresh appreciation of the need for U.S. involvement in the region, in the roles of power balancer and security guarantor.

China's ongoing military build-up is a cause for concern in both the United States and Japan. Both countries have strong economic and growing political ties with China, but both are wary of China's long-term ambitions in the region, and its potential behavior if it assumed hegemonic status in the region. This shared concern is a long-term driver of U.S.–Japan security cooperation: the United States needs Japan to maintain a forward presence in the region, and this military engagement denies hegemonic status to China.

This power balance extends to space policy. China has a network of eighteen reconnaissance satellites that allow it to spy on its neighbors from above and monitor military activities in the region. Even after Japan reconnaissance satellite system is fully deployed, it will still rely upon the United States to balance China's space-based capabilities. Space-based technology would play an important role in any plausible scenario for a war across the Taiwan Strait—early detection of Chinese missile launches could protect Taiwan's large cities from devastating casualties. The threat to Japan itself is much more unlikely and remote, but long-term historical grudges keep the Sino–Japanese relationship in a lukewarm state, cordial at best.[xiv]

North Korea's stated nuclear ambitions and proven ballistic missile capabilities pose a real threat to the territory of both the United States and Japan. By many standards, this is the most dangerous threat in the world today. Of greater concern at present is the situation on the Korean Peninsula. North Korea's conventional military capabilities could devastate South Korea and inflict massive civilian casualties if a conflict were to break out. This tense situation has heightened the sense of danger in the region to a level not witnessed since the end of the Korean War, and brought security issues to the forefront of the U.S.–Japan bilateral relationship.[xv] Japan and the United States are not without their differences on the right response to the North Korean threat, but the two countries have strengthened their cooperation on this issue of mutual concern.

The North Korea threat has strong implications for space policy. Even after the launch of its own reconnaissance satellites, Japan remains reliant on the United States for launch detection and high-grade space imaging. The two countries are cooperating on research for a theater-wide ballistic missile defense system, which would utilize sea-based and space-based assets to detect and destroy any missile launched from North Korea toward Japan or the United States.

This mutual dependency has led to an overall improvement in the U.S.–Japan security relationship and reinforces the need to find a new framework for space policy cooperation that is based more strongly on security concerns.

B. Shift in Japanese outlook toward security and use of force

Since the end of World War II and the period of American occupation, the Japan Self-Defense Forces (JSDF) have been constitutionally bound to be used only for defensive purposes. During the Cold War, this arrangement suited both the United States and Japan. The United States had little reason to fear that Japan would re-emerge as a destabilizing power. Under America's defensive umbrella, Japan was able to turn inward, focus on reconstruction, and reinvent itself as a peaceful, commercially-focused nation. In 1969 the Diet extended this principle to outer space, and passed a resolution affirming that Japan's space program would be solely motivated by science.

This principle, which made sense for the Cold War world, is increasingly ill-suited for a world in which the greatest security threats come not from major powers, but instead from rogue nations and non-state actors. In this new environment, states that maintain a purely inward-focused defensive stance look like they are evading their international responsibilities. For this reason, Japan has moved tentatively in recent years to change its defense policy, most recently in June 2003 when the Diet passed three defense bills that established a framework to give the prime minister and JSDF emergency war-time powers.[xvi]

Japan Maritime Self-Defense Force (JMSDF) played a re-supply role (for non-lethal provisions only) in the Indian Ocean during the wars in Afghanistan and Iraq. It is cooperating with the United States in the research of a ballistic missile defense system. And it has begun to launch a new family of reconnaissance satellites. These new satellites are technically controlled by a civilian agency (Cabinet Information and Research Office, (CIRO)) and have some scientific functions, so Japan is able to still claim that their main use will be scientific. This artifice is well-known, and it is welcome from the United States' perspective. This shift could indicate a willingness to engage with the United States in a broader domain of space policy, and prompts a reassessment of the relationship.

C. Decisive role of space in American war during recent conflicts

In the last fifteen years, the U.S. military has integrated space-based assets into its warfighting, helping to give it a level of battlefield superiority unmatched in modern history. The promise of space-based technology was first seen during the first Gulf War, and reached its full potential during the recent conflicts in Afghanistan and Iraq. Satellites facilitate a range of key activities: letting troops know their precise positions, and the locations of nearby units; setting targets, and then guiding missiles precisely to them (and minimizing

collateral damage); detecting and destroying inbound missiles; flying remote-controlled unmanned aerial vehicles (UAVs); and conducting real-time battlefield damage assessment. These tasks, and numerous others, are possible because of the tens of billions of dollars that the United States has invested in space-related technology over the past decade.

The consequences of this dominance are two-fold, impacting the U.S.–Japan space policy relationship. First, dominance enhances the relative power of the DOD in internal policy debates over space policy priorities. Security-related concerns now trump economic concerns in any calculation of U.S. space policy interests. Second, this technological lead leaves the United States at the risk of isolation. If its key allies lack the capability to fight side-by-side with American troops, then coalition-building and joint military activities become correspondingly more difficult. These conflicting factors compel the United States to reevaluate its relations with Japan, and find ways to integrate Japan into its key space systems without risking the dissemination of technology to bad actors.

D. Sensitivity to export control issues in the United States

A final change in the external context for U.S.–Japan space policy is the issue of export control and technology transfer. The political scandals in the United States in the late 1990s involving major satellite companies (Space Systems/Loral, Hughes—today's Boeing Satellite Systems) and Chinese government-owned companies are still salient, especially in Congress, and create a risk to any efforts to enhance the U.S.–Japan relationship in space policy. Once U.S. technologies are transferred to other countries, even strong allies, the ability to control access to these technologies is weakened.

Of particular concern at present is the issue of ballistic missile technology in North Korea. A North Korean defector told a Congressional committee in May 2003 that 90 percent of components for a North Korean missile project had been smuggled from Japan.[xvii] The Undersecretary of State for Arms Control, John Bolton, testified in June 2003 about the complicity of *yakuza* (Japanese organized crime) in funding North Korean weapons of mass destruction (WMD) activities.[xviii] These reports are not likely to reassure U.S. military officials and members of Congress about the wisdom of transferring key technologies to Japan, at least until stronger safeguards are put in place. At the same time, U.S. industry risks losing deals to foreign competitors (such as Arianespace) if export controls are too strong, or if the approval processes are slow and overly bureaucratic. Given the potential for career setback and possibly scandal if a wrong decision is made, the bureaucracy that manages this process is naturally cautious; any impetus for reform needs to come from senior leadership in the U.S. government.

III. Key Issues in U.S.–Japan Space Policy

The cases in this chapter tell the story of three important areas of engagement for U.S.–Japan space policy at present: launch vehicles, remote sensing, and navigation satellite systems. These are not the only issues of importance today, but they are illustrative of the challenges that are faced in the broader relationship. In each case, there are still key decisions that both countries will need to make in the next few years. Each case exemplifies the conflicting dynamics in space policy today, and taken together, they reveal a picture of the two countries' priorities and the contours of a new bilateral framework.

1. Issues in Focus (1): Launch Vehicles

Launch vehicles have a critical role in the space value chain. If countries cannot get their satellites into orbit, they have no space program. But the launch vehicle industry has taken a difficult hit in the last few years. The demand for launches is shrinking due to the collapse of the commercial communications satellite market and the longer operational lives of today's satellites. New low-cost competitors (China, India, SeaLaunch) are crowding the market, forcing the high-cost space programs (United States, Japan, Europe) to subsidize their space launch industries. Agreements between the United States and Russia, Ukraine, and China limited the launch capacity of the latter countries in the 1990s, but these agreements have lapsed. All of these developments suggest a launch vehicle industry that has lost its strategic importance.

This is deceiving. The security imperative in the United States and the desire for autonomy in Japan are both still strong. Neither country is likely to exit the market in the face of low-cost competition. This leaves the two countries with three non-mutually-exclusive options: subsidize, innovate, and/or reduce costs. The first option is the least painful in the short-term, but ultimately the most costly. The latter two options require substantial up-front investment, but have the potential to deliver long-term returns. One way to minimize these investments is international partnership, and the United States and Japan should expand their cooperation in the area of launch vehicles to achieve these goals.

Launch vehicles have played a leading role in the history of U.S.–Japan space policy, as described in the narrative history of U.S.–Japan cooperation in Chapter 1. The original 1969 Exchange of Notes between the two countries focused on launch vehicle technology, and provided Japan with access to U.S. technology in exchange for controls on its use. Japan's early generations of launch vehicles ("N" and "Q") were developed by through licenses of American technology, and were Japan's primary platforms until the mid-1980s. Japan decided in 1980 to develop an autonomous launch vehicle, the H-I, that could carry a 1200-pound payload to geosynchronous orbit.[xix] It began launching in 1986 and was in use until 1992. During that time, Japan began to develop the H-II as a successor to the H-I, intended to carry a two-ton payload to geosynchronous orbit.

The H-II turned out to be a disaster for the Japanese space program. Two successive missions failed in 1998 and 1999 (including one with a $584 million payload) and launch costs were high. In 2001 the Japanese government introduced a modified version, the H-IIA, and to date all of its launches have been successful. It can carry a payload of four tons to geosynchronous orbit, and variant models in the next 2–3 years will enable it to carry up to seven tons, competitive with Boeing (Delta), Lockheed (Atlas), and Arianespace. But it remains expensive, and few customers are to be found. Space Systems/Loral and Hughes both cancelled contracts with Rocket System Corporation (RSC), the private consortium that operates space launches in Japan.

The U.S. government focused its research on launch vehicles in the 1990s in two areas: evolved expendable launch vehicles (EELVs) and reusable launch vehicles (RLVs). EELVs were designed to build cost-savings into the launch vehicle and launch process. The program was initiated by the Department of Defense (DOD) and both Boeing and Lockheed Martin developed launch vehicles as part of this program (the Delta IV and Atlas V respectively). The EELVs are still relatively high-cost, in spite of the project's intent, and came onto the market at the same time that commercial launch demand was collapsing.

The U.S. government also made substantial investment in reusable launch vehicles in the 1990s, hoping to develop a launch vehicle that could replace the Space Shuttle and operate at a low cost.[xx] This initiative was unsuccessful. National Aeronautical and Space Administration (NASA) spent a total of $1.4 billion on two RLV programs (X-33 and X-34) over the course of the project lives.[xxi] NASA ended the two programs in March 2001. Japan, by contrast, continues to invest in research on RLVs. Much of Japan's research is still early stage, and it has formed a loose partnership with Europe for RLV development.

These separate areas of focus could be the basis for a deal between United States and Japan. The United States could provide relevant information on its EELV capabilities to Japan in exchange for insight into the latter's work on RLVs. A deal such as this has a number of obstacles—export control issues, fair accounting for each country's contribution, and third-party entanglements (such as Japan's current relationship with Europe on RLVs), but these problems are solvable, given the desire to avoid costly subsidies as much as possible and focus instead on investment in cost-saving and innovation.

2. Issue in Focus (2): Remote Sensing

The remote sensing satellite field[xxii] is a significant area of engagement for the U.S.–Japan space policy relationship, one where commercial and security interests often collide and policymakers face real choices about how to balance these interests. Two key developments in remote sensing policy have created a fresh context for U.S.–Japan cooperation in this area: the launch of Japan's first reconnaissance satellites in March 2003, and the announcement of the new U.S. remote sensing policy in April 2003. These two developments make remote sensing a test case for the broader relationship.

The remote sensing satellite field dates back to 1960, and reached maturity in the 1970s with the launch of the first LANDSAT satellites. Remote sensing satellites are used for a wide range of purposes, across all three key drivers of space policy. In the area of science, remote sensing helps with diverse tasks such as environmental monitoring, disease control, and meteorology. Commercial uses of remote sensing include agricultural monitoring, oil and mineral exploration, and the development of geographic information systems. Remote sensing has numerous security-related uses as well, such as launch detection (using remote sensing radar satellites) and space-based imagery. DOD operates several dozen reconnaissance satellites (classified and unclassified) that are used for national security purposes.

Japan launched its initial two reconnaissance satellites into orbit in March 2003, the fruition of a process that had been underway since the Taepodong-1 missile launch by North Korea in 1998.[xxiii] Two more satellites will be launched in 2004 to complete the program, at a total estimated cost of 250 billion yen.[xxiv] Japan had been involved in remote sensing activities since the 1970s, but to this point with a strong focus on scientific research. The new satellites will have some scientific uses, but little effort has been made to disguise the fact that their primary missions are security-related, enabling the country independently to acquire imagery from areas of key concern and monitor missile launch activity. "I have high expectations that the satellites can now help boost our country's own information-gathering capability," said Prime Minister Koizumi after the satellites were successfully placed in orbit.[xxv]

Less than one month later, the U.S. government released the U.S. Commercial Remote Sensing Policy,[xxvi] an attempt to adjust policy to new realities and strike the balance between security and commercial interests in this area. The policy acknowledges the reality that the technology gap has closed between commercial remote sensing systems (such as Space Imaging's Ikonos and DigitalGlobe's QuickBird) and military systems. The policy encourages US space agencies to acquire imagery from these private sector sources, and focus new development on leading-edge and/or scientific missions. The policy also clarifies U.S. export control in the area of remote sensing and expresses support for government-to-government cooperation—but only if it does not harm security or undercut private sector firms.

These two policy shifts create an uncertain context for U.S.–Japan cooperation. The United States is starting to shift the responsibility for space imagery out of the government and to the private sector at the margin (at the low- to medium-end range of technological capabilities, and only to a small degree to date; the U.S. government still has strong dominance of high-end capabilities), just when Japanese government is getting into the business. Japan's quest for autonomy has not been cheap, and officials in the Japanese government have anonymously admitted that the performance of its imagery satellites has been lower than commercially-available alternatives to date.[xxvii] But if it can solve these technical issues, it will no longer find itself in a situation of dependency, worried about the risk that the US government will invoke shutter controls or monopolize the imagery intake at high-priority times.

The relationship will continue to evolve along one of three distinct paths. In the first scenario ("U.S.-dominant"), there is an imbalance of dependency in the relationship: the

United States has little use for Japanese capabilities, but Japan is still reliant on the United States (including private sector firms) for the foreseeable future.

In the second scenario ("Autonomy"), Japan develops fully autonomous capabilities and its reliance on the United States shrinks. The two countries operate side-by-side and exchange data at the margins, but there is little real value created from any cooperative efforts.

In the third scenario ("Partnership"), Japan develops a strong capability AND works at the same time to increase its partnership with the U.S. government. The two countries allocate resources and share imagery more efficiently and on a real-time basis, and create institutions that facilitate cost-sharing, research and development, and best-practice sharing for imagery analysis.

Right now the relationship is close to the first scenario, and it is uncertain whether it will shift to the second or third scenario. It is in the overall interest of both countries to move toward the Partnership scenario, but there are forces in both countries that would be resistant to such close ties. These obstacles can be overcome in two ways: by taking easy, near-term steps to increase cooperation now (such as improving cooperation on data analysis and response)[xxviii], and by moving forward in the context of a comprehensive reassessment of the U.S.–Japan space policy relationship.

3. Issue in Focus (3): Navigation Satellite Systems

A third key area of engagement for the United States and Japan is in the area of navigation satellite systems (alternately described as positioning, velocity, and time (PVT) systems).[xxix] This segment of space activity has become one of the most important from both a commercial and security perspective in the last few years, and need for cooperative activity to negotiate the competing desires both within and among countries is strong.

Three key developments are re-shaping the playing field for navigation satellite systems at present: changes to the Global Positioning System (GPS); the development of Galileo in Europe; and the potential development of the Quasi-Zenith Satellite System (QZSS) in Japan. These developments have the potential to improve the public good and global economic potential of navigation satellite systems; or, if policies are carried out unwisely, to lead to unnecessary spending and market confusion.

GPS was developed by the United States military in the last 25 years and has emerged as a true global standard in the 1980s and 1990s. The system facilitates a wide range of commercial activities, such as truck fleet management, air navigation, maritime safety, and surveying. But it also has significant military uses: as discussed in Chapter 1, smart-bomb guidance systems utilize GPS to achieve precision in targeting, and ground troops achieve real-time situational awareness by using GPS to locate other units.

GPS utilizes 24 satellites at medium-earth orbit (MEO). The orbits of these satellites are synchronized in a way to provide persistent coverage to almost any place in the world.[xxx] A

third generation of GPS satellites is under development (Block III). The first satellite is expected to be launched in 2012, and the constellation would have an operational life until 2030.

The GPS system broadcasts two codes: the precision (P) code, encrypted and used for military purposes; and the Coarse Acquisition (C/A) code, freely available and intended for civilian uses. The P-code has a greater degree of accuracy than the C/A-code, but the difference in terms of functionality has narrowed in the past decade, for two reasons: first, a number of regional, land-based differential GPS (DGPS) systems have been installed that triangulate signals from multiple satellites and improve C/A accuracy to within one meter. Second, in May 2000 the US government decided to end selective availability (SA), a system feature that had been deliberately used to degrade the civilian signal. This went into effect immediately, and SA has not been used again since its deactivation, even during the conflicts in Afghanistan and Iraq. New civil codes are being introduced to the system that will improve system performance, and the next generation of GPS satellites (including the final Block II satellites) will introduce at least one new code: the military (M) code, designed to make it more difficult for adversaries to spoof GPS and degrade the performance of precision targeting systems.

The second major shift in the playing field for navigation satellite systems has been the decision by Europe to develop an autonomous Global Navigation Satellite System (GNSS), called Galileo. In May 2003, the European Space Agency (ESA) gave its final approval for the development of Galileo, elevating a long-running dispute between the United States and Europe to the next stage. In the late 1990s, the United States saw its development and promotion of GPS as a public good, in which it had invested $10 billion over 25 years and provided to the entire world at no cost. In spite of this economic logic, Europe began to develop Galileo in 1999, a new navigation satellite system that could be launched within the next decade to rival GPS. European ministers gave various reasons for proceeding with Galileo: spurring the development of new user applications, building markets for ancillary products (such as receivers), creating new jobs in Europe, challenging a U.S. 'monopoly' in a strategic industry, and ensuring control over its navigation satellite future.

The United States was dismayed by this decision, for several reasons. First, the new system held the potential to interfere with GPS, in the same way that two radio stations next to each other on the dial can pollute each other's signal. Second, the United States feared that Europe would compel European users to switch to Galileo at the expense of GPS (perhaps by pressuring automotive and telecom companies to adopt Galileo), and would reserve development of the system to European firms. Last (and less explicitly stated), American policymakers were taken aback by Europe's sense of unease at the U.S. intentions for GPS, and the European fear that U.S. control could be used as an economic weapon against their interests. Even the decision to end selective availability did little to dispel these misgivings and halt the forward momentum for Galileo.

There has been a substantial dialogue between the U.S. government and relevant European officials on the issues of GPS and Galileo, with U.S. negotiators focused on interoperability, consumer choice, and open procurement. But following the recent decision by the ESA to move forward, the reality is that Galileo will emerge as a challenger to GPS in the next decade, barring an unexpected reversal of course.

The third major development in the area of satellite navigation systems, and of the most relevance to this report, is Japan's development of a regional navigation satellite system. The evolution of the GPS-Galileo case, as described above, offers lessons to policymakers in both the United States and Japan about how to manage cooperation between GPS and Japan's entry into the navigation satellite system arena.

Japan is the world's leading country in the adoption of civilian GPS applications. More than 70 percent of worldwide demand for on-board automotive navigation systems is in Japan,[xxxi] and two million units were sold in the country in 2002.[xxxii] GPS-enabled phones allow wireless providers to provide location-based services, and at least 3.8 million are in use at present.[xxxiii] But Japan's geography is poorly suited for existing GPS systems. Mountainous terrain and urban canyons hinder ubiquity of service and inhibit the development of new services that rely on the locational accuracy of GPS. For this reason, Japan has moved forward in the last two years with a concept for a new regional navigational satellite system: the QZSS.

The QZSS is envisioned to be a three-satellite system that would be placed in orbits at a 45 degree angle from the equator at an altitude of 36,000 km, and travel in a figure-eight pattern over East Asia.[xxxiv] The satellites' altitude (higher than the GPS medium-earth orbit satellites) would facilitate line-of-sight communication with ground receivers in most mountainous regions and urban canyons. The QZSS would be a dual-purpose system, containing both a commercial S-band communication payload and a navigation payload. The navigation system would utilize the same frequencies and protocols as GPS, and would be in effect a regional extension of GPS, rather than a competitor. The Japanese government budgeted 5.8 billion yen for research on the system for fiscal year 2003, and it is estimated that a three-satellite system could cost up to 210 billion yen over the project life.[xxxv] A consortium of forty-two Japanese companies, led by Mitsubishi Electric Corporation (MELCO), Hitachi, Itochu, NEC/Toshiba Space (NT Space), and Toyota established a new joint-venture, Advanced Space Business Corporation (ASBC), to conduct a feasibility study for the development of the system.[xxxvi] There is a great deal of uncertainty over how the costs will be split between the Japanese government and private industry, and which party should own and control the system; the private sector has suggested that the government should pay no less than half of the total cost.[xxxvii]

To date, cooperation between the United States and Japan has been strong on navigation systems. As mentioned in Chapter 1, the two countries signed the *U.S.–Japan Joint Statement on GPS Compatibility* in 1998. In October 2002, the United States and Japan reconfirmed the principles of this statement and agreed to establish a technical working group that will coordinate the details of GPS and QZSS compatibility.[xxxviii] Both countries have strong incentives to cooperate: the United States is not interested in seeing a repeat of the Galileo episode, and Japan does not want to promote a new or modified standard that would harm its installed base of users or the companies involved in the manufacture of GPS equipment in Japan.

Despite this apparent harmony, there are still several issues that could confound this spirit of cooperation. First is the issue of encrypted military GPS codes: both the P-code and the future Block III M-code. The imperative for military cooperation in the region (discussed in

Chapter 1) drives the need for integration of key defense-related systems with allies. But GPS encryption is one of the crown jewels of sensitive military technology, and will not be shared without extensive safeguards and controls.

Several outcomes are possible. The U.S. government could black box the P-code and/or M-code on the Japanese system. It could provide Japan with modified versions of these codes. Or Japan could decide to develop its own encrypted code, which may or may not be interoperable with U.S. equipment.

A second issue is related to procurement. U.S. companies that have developed GPS satellites and ground infrastructure will likely want to participate in the development of QZSS. The Japanese government has to decide whether it will seek a most-favored nation (MFN) exemption for the system on security grounds, allowing it to procure the system entirely from Japanese companies (perhaps with U.S. firms playing a role as subcontractors), or allow open, international competition for procurement. If this issue is not appropriately managed, it could lead to a low-level trade dispute between the two countries.

The third issue is the need for a long-term strategy in navigation satellite systems. Some in Japanese government and industry are already looking beyond the QZSS, examining regional performance deficiencies in the region even after QZSS is operable. These plans incorporate the impact of Block III GPS satellites on the performance of any regional constellation. A second consortium of companies led by Itochu Corporation and NTSpace has proposed a concept for a new system, "Japanese Regional Navigational Satellite System" (JRANS) as a potential augmentation to QZSS, featuring four satellites in highly elliptical orbit (HEO) that would make additional incremental improvements to system performance in the region and increase Japan's autonomy.

The Japanese government has not yet come forward with a position on a second stage regional system. In addition, by the time that this issue arises, Galileo will likely be operational—and if the experience of the current decade has not been positive, Japan could decide to move over and align with the European system. Overall, the record of cooperation between the United States and Japan in this area is currently strong, but steps still need to be taken to ensure a successful partnership and maximize the economic and security-related interests of both countries.

IV. Cooperation Between the United States and Japan: Imperatives and Obstacles

This chapter shifts back to a broad focus on U.S.–Japan space policy, building on the context established in Chapter 1 and the lessons from the examples in Chapter 2. It looks at the relationship from a broader perspective, focusing on two critical questions:

1. Why should each country want to change the relationship?
2. What should be the substance of this new relationship?

These questions need to be asked and answered before making recommendations about the relationship—it would be unwise to simply assume that it is in the national interest of both countries to cooperate, without first examining the reasons for and against.

We focus on each country in turn, first the United States and then Japan.

1. The United States

The United States is stronger today in military terms than any nation in history. Its economy, even in a period of relative vulnerability, remains the envy of the rest of the world. Its key space-related institutions (NASA, DOD, etc.) are funded at a level that gives it competitive advantages that only the European Space Agency (ESA) can hope to match. The U.S. space industry leads the world, developing cutting-edge systems and technologies for both the military and commercial markets. Given this record, it is valid to ask why the United States is not adequately served by the status quo, and why it would be in its interest to alter its relationship with Japan in the area of space policy.

A case to maintain the status quo is supported by two related arguments. First, it is possible that a strengthened relationship would create new bureaucratic processes or controls that inhibit American freedom of action in space. During the conflict in Kosovo let by the North Atlantic Treaty Organization (NATO) in 1999, target selection became a least-common-denominator process among the members, reducing the effectiveness of the military campaign and frustrating American decision-makers. The current Bush administration is loath to agree to policies that circumscribe its freedom of action, and it is not unimaginable that a new framework for space policy would be resisted if it fostered such constraints.

Second, the United States is increasingly concerned about the transfer of sensitive technology, as discussed in Chapter 2. An important element of any new framework would be the negotiated exchange of technology, both hardware (such as sensors) and software (such as encryption codes). Any time that critical technology is shared more widely, it becomes less secure. The United States could be unwilling to transfer technology to a key

ally such as Japan simply due to the increase in the risk (however slight) that this technology could end up in undesired places. Similarly, there is likely to be concern that technology transfer will benefit Japanese industry at the expense of American companies. The story of Japan's takeover, perhaps unfairly, of key industry sectors that were pioneered by American firms (from TVs to semiconductors) remains resonant in the American psyche, and should not be discounted as a potential barrier to cooperation.

These arguments are counter-balanced by four positive imperatives for the United States to support a new framework for cooperation. First, the federal government faces growing fiscal constraints, and a stronger relationship with Japan could facilitate cost-sharing on research and development (R&D) and expensive projects (as is currently the case with the International Space Station and ballistic missile defense).

Second, a stronger relationship could increase business for U.S. firms in the space industry. American aerospace companies would likely be able to increase their role as high-value subcontractors on Japanese-led projects. Smaller companies could improve their access to the Japanese market. In addition, by taking away the incentive for Japanese firms to develop autonomous capabilities, new competition would be preempted, at least in the short to medium-term.

Third, the United States would gain a stronger position as a global standard-setter for space technology. Its leadership has been under assault in recent years, most notably in the case of Europe's Galileo system. Japan can be thought of as a "swing vote" in the global standards-setting battle. Stronger cooperation will improve the United States' ability to persuade its ally of the wisdom of alignment on standards. This could have the secondary effect of dissuading Europe from introducing new, competitive standards in the future.

Fourth, and most importantly, a new framework could strengthen the overall bilateral alliance and Japan's regional security posture, to the benefit of U.S. strategic interests. By treating Japan as a trusted partner in space policy, the United States would assist Japan's cautious steps forward toward assertiveness in regional security, and also help to keep its views in concert with U.S. policy. This would facilitate responsible and cooperative action on critical concerns of U.S. policymakers, in particular over North Korea.

These four positive reasons for cooperation outweigh the cautionary or negative factors discussed earlier. On balance, it makes sense for the United States to support the idea of enhanced cooperation with Japan in the area of space policy. But what should this new framework look like? From the U.S. point of view, any new agreement between the two countries might include the following elements:

1. Commitment by Japan to participate in new science-focused space projects.
2. Agreement on launch quotas to prevent predatory pricing in the market and ensure sufficient demand for US companies
3. New tightly-written assurances on space technology transfer, in effecting creating an export control "customs area"
4. Reinforcement of the commitment to full compatibility of the Quasi-Zenith Satellite System (QZSS) with the Global Positioning System (GPS).

5. Real-time access to intelligence from Japanese satellites in any areas where there are gaps in U.S. or private sector coverage.

These positions will mitigate the potential downsides and reinforce the benefits of a new framework from the U.S. perspective.

2. Japan

Japan can draw up a similar ledger of costs and benefits from any move to alter its space policy relationship with the United States. Like the United States, it could easily make the argument, "Why change?" In the current relationship, Japan maintains strong ties with the United States in a few priority areas (e.g. environmental monitoring, International Space Station) but retains the prerogative for independent action. If Japan were to strengthen its ties with the United States, it could lead the country to a state of dependency, both in commercial and security terms. Japanese firms might find themselves stuck in the low-value stage of the space value chain. If Japan had a serious disagreement with the United States on a major security issue, it could find itself ill-equipped to part ways (a low-probability scenario).

Another potential obstacle to change is Japan's traditional support for the non-militarization of space, embodied in the 1969 Diet Resolution on the use of space. If Japan's government were to align itself more closely with the United States on space policy, it could face a rebellion from elected officials who support the country's post-World War II pacifist stance, and a backlash from the general public, which has been divided over the issue of revising Article 9 of the Constitution and related policy shifts.[xxxix]

These factors provide a rationale for Japan to pursue an independent space policy, rather than focus on international cooperation. But they are offset by a set of other factors that provide positive incentives for cooperation with the United States.

First, cooperation is cost-effective. Japan's space budget is small in comparison with the United States. Its past investments in the development of autonomous capabilities, such as the H-II and H-IIA launch vehicles, have been expensive and difficult to justify on economic terms alone, especially in cases where foreign private industry can already supply superior technology at a lower cost. If Japan were to pool its costs with the United States on leading-edge systems and technologies instead of outmoded ones, it would achieve superior returns on investment and could lead to greater spillover effects in the broader economy.

Second, an agreement could facilitate standardization and compatibility of key technologies (e.g., GPS and QZSS), promoting positive secondary economic effects in Japan's economy. As mentioned earlier, Japan has the highest market penetration of vehicle-based positioning systems in the world, and has a leading position in the deployment of GPS location-based services on mobile phones. Japan can use this 'early adopter' position to continue to grow its market share for consumer products that use space-based technology. This early market leadership could stall if there is uncertainty or divergence on standards.

Third, Japan's national security would improve in a new framework of cooperation, due to improved technology and more importantly, to increased real-time collaboration in the areas of intelligence and missile defense. Japan would be better positioned to avert or detect a ballistic missile attack from North Korea if its space systems are integrated with American systems. Defending against a missile attack is a vital national interest for Japan at present, and this integration would increase the country's security.

As with the United States, the benefits outweigh the costs of collaboration. Japan should work to include the following elements in any potential new space policy framework:

1. "Trusted partner" status—real-time access to intelligence from US systems as the rule, not the exception.
2. Narrowing of stringent export controls for products coming from the United States to Japan, including new institutional mechanism to reduce lengthy approval times.
3. Increased subcontractor or supplier role on contracts from U.S. space agencies, in areas where Japan has an existing technological lead.
4. Freedom to engage and partner with Europe on projects. Japan will not want to reduce its ability to work with Europe as a cost of forming a closer relationship with the United States.

On balance, the imperatives for cooperation outweigh the current obstacles in both the United States and Japan. But awareness and good intentions are meaningless unless both countries take active steps to negotiate a framework that clarifies the two countries' common interests, and provides institutions and private companies with the capabilities and incentives to act upon these interests and reap the benefits of cooperation. The next chapter examines the steps that both countries need to take, acting both in common and alone, to create a new space policy relationship.

V. Recommendations: Steps Toward a New Framework

Chapter 1 examined at the key drivers of space policy, the rich and complex history of U.S.–Japanese space policy cooperation, the institutions that have played a leading role in this relationship, and the key changes to the context of the relationship over the last decade. Chapter 2 looked closely at three functional areas—launch vehicles, remote sensing, and satellite navigation systems—that illustrate the dilemmas in managing space policy and offer important insights about the relationship. Chapter 3 analyzed the imperatives for and against cooperation in each country, and the form that cooperation should take.

In this final chapter, we synthesize these findings and provide a set of recommendations, both for joint action and specific to each country. These six recommendations are intended to maximize the individual and mutual returns that both countries receive on their investments in space, in terms of science, commerce, and security. The recommendations in some cases also extend to space policy in general. Together, they create a new framework for U.S.–Japan space policy.

Recommendation #1: New U.S.–Japan Bilateral Framework for Space Policy Cooperation

As discussed in Chapter 1, the context for space policy has changed significantly in the last decade. A new generation of space-related technology has developed. The commercial relationship between the United States and Japan has become less politically charged. The strategic importance of the space industry has shifted, and certain segments within the industry have become more strategic (e.g. services, payloads) at the expense of others (e.g. launch vehicles). Most importantly, the world faces new kinds of global and regional security threats. But the existing bilateral policy framework has only changed incrementally during this time and is now outmoded. A new framework should replace the *1969 Exchange of Notes* and the *1990 Agreement on Satellite Procurement*, and encompass all recent bilateral activity, such as the *1998 Joint Statement on Cooperation in the Use of the Global Positioning Systems (GPS)*. Recent bilateral activity has been piecemeal rather than comprehensive, and a new agreement should fill in the gaps to cover the following topics:

? **Strengthen institutional ties in security-related aspects of space policy**. The framework should clarify the mechanisms and processes for dealing with security-related space policy issues. Specifically, each country should designate a lead person to handle these issues (the Assistant Secretary for International Security Affairs in the Department of Defense (DOD), and the Director-General of the Defense Policy Bureau at the Japan Defense Agency (JDA)), and the two counterparts should meet at least once annually to update and review defense-related cooperation in space.

Other government entities such as the Department of State in the United States and the Ministry of Foreign Affairs in Japan would be involved in these consultations as appropriate.

? **Commitment to common standards**. Building on the 1998 GPS Agreement, the two countries should affirm their commitment to utilizing common standards in all areas where economies of scale exist and the benefits of standardization are obvious and mutual, including GPS/Quazi-Zenith Satellite System (QZSS), and voice and data communications. The intent of standardization would be to ensure seamless experience for system users and limit the potential for system interference.

? **Trade and export control**. A centerpiece of the agreement should be an explicit bargain between the two countries: the United States will reduce its export controls for space and satellite technology to Japan, in exchange for uninhibited most-favored nation (MFN) access to all segments of the commercial space industry and strong safeguards against the transfer of sensitive technologies to third countries.

? **Joint research and development**. The agreement should encourage joint research and development projects, and more importantly, establish new incentives for the various space agencies to cooperate. The agreement should establish defined procedures for the use and licensing of jointly-developed technologies that appropriately remunerate both nations' entities for their investments. The two countries should strengthen programs and mechanisms for the exchange of scientists between their key space agencies, to build the personal relationships and trust that lead to successful joint research. The two countries should not set specific research goals or targets, but delegate that to the respective agencies and related commercial entities.

? **Launch vehicle utilization**. In the 1990s, the United States was able to use trade policy levers to encourage a number of countries (Russia, China, and Ukraine) to limit their launch vehicle capacity. Many of these agreements have expired, and there is a risk that these countries will now use non-market incentives to support their launch industries, creating a supply spike that distorts and weakens the overall industry. The two countries should affirm their common willingness to use both national trade policy tools (such as Section 201 in the United States) and international trade policy levers in the World Trade Organization to deter such activities.

? **Institutional ties**. The two countries should strengthen the existing channels of space policy cooperation, particularly at the senior levels of government. The existing medium-level contacts between the two countries are strong, and there is an ongoing dialogue on issues of common interest. However, these channels of communication lack a strategic focus due to the absence of attention by senior policymakers, particularly in the National Security Council (NSC) and Office of Science and Technology Policy (OSTP) in the United States. The NSC and OSTP should fully utilize existing Policy Coordinating Committees (PCCs) to clarify goals and set priorities for the relevant agencies, and then monitor their progress on a frequent basis toward these goals.

Recommendation #2: Institutional Reform in the United States

The United States should make changes to its space policy institutions to reflect the new realities of the U.S.–Japan relationship, and more importantly, the broader changes in the space policy context in the last decade.

The United States has taken important steps in the last two-and-a-half years to clarify and reorganize its administration of defense-related space issues, following the lead of the *Commission to Assess United States National Security Space Management and Organization* (also known as the 'Space Commission' or the 'Rumsfeld Commission') in 2000. The United States needs to build upon this momentum and take similar steps to reorganize the framework for managing its commercial space interests and mediating between the concerns of security and commerce. To undertake the former, it should form a task force that emulates the Space Commission and is composed of former government officials and private sector representatives. It should study the relationship between the key agencies focused on commercially-related space activities (e.g., Department of Commerce, Department of State, Department of Transportation, Federal Communication Commission) and determine whether and how a streamlining of authority would enhance American interests.

The only entity in the federal government that can effectively mediate between security and commercial interests in space is the Executive Office of the President (EOP). There are several institutions within the EOP that focus on space, such as NSC and OSTP, but none of them have space as their exclusive purview, and are often distracted by other issues of immediate concern. To resolve this dilemma, the United States should utilize and staff the National Space Council (NSpC), with a director who would serve as a space policy 'czar' and be responsible when the interests of key agencies are in conflict. The authority for a National Space Council already exists; the Administration simply needs to act to staff and operate it.[xl] The following agencies would be permanently represented on the council: DOD (two slots, one for a relevant civilian official, one for the U.S. Air Force); Department of Commerce; Department of State; National Aeronautical and Space Agency; Department of Transportation (Federal Aviation Agency); and the National Science Foundation. Other government entities such as the FCC would have ad-hoc membership depending upon the issue at hand.

Recommendation #3: Institutional Reform in Japan

In similar fashion, Japan should reorganize its space policy institutions as a means to improve both bilateral cooperation and the overall effectiveness of its own space programs.

The Koizumi government announced in 2001 that it would merge its two key space agencies together, the National Space Development Agency (NASDA) and the Institute of Space and Aeronautical Science (ISAS), as well as the National Aeronautics Laboratory (NAL). This merger is a good first step, but it is insufficient. A large portion of Japanese government

spending on space programs is outside the control of these entities. For example, the reconnaissance satellite program is run from the Cabinet Office, which is politically expedient but economically inefficient, given potential benefits from cost-sharing and knowledge transfer. Numerous government ministries, such as the Ministry of Economy, Trade and Industry, and the Ministry of Education, Culture, Sport, Science and Technology, have overlapping jurisdiction in space policy, and these relationships should be clarified, or a new forum introduced to mediate among them, along the lines of the NSpC proposal in recommendation #2 (above).

The JDA's role in space policy should also be upgraded and clarified in the course of any institutional reorganization. Japan's traditional attitude toward space policy has precluded any JDA role in space for most of the post-WWII period. Given the new realities of the East Asian security environment and the integration of space technology into air-, sea- and ground-based military operations, this needs to change. The U.S. DOD needs a counterpart for space policy in Japan, and the JDA is the appropriate entity to assume this role. Any arrangement that falls short of direct contact between the DOD and JDA could lead to sub-optimal security benefits.

Recommendation #4: Revision of 1969 Diet Resolution in Japan on the Use of Space

Japan should also revisit its 1969 Diet Resolution, which limited Japan to scientific and commercial space activities. This resolution is out-of-date, due to new threats to the regional security and Japan's response to these threats. The Japanese government should put forward a new resolution that amends the 1969 Resolution, clarifying that military-related space activities that are 'defensive' or 'non-aggressive' in nature (and perhaps only in defense of Japanese sovereign territory) are acceptable. This amendment would preserve the pacifist spirit of the 1969 Resolution but bring it in line with the new realities of regional and international security.

Recommendation #5: Continue to revise Japan's space policy to reflect ever-evolving nature of its security environment

In March 1978 the Space Activities Commission in Japan first announced the Fundamental Policy of Japan's Space Activities, a document that has been revised periodically (on average, every 5-6 years) to reflect the current realities of Japan's space program.

On June 19, 2002, after the realignment of government agencies in 2001, the Council of Science and Technology Policy announced the "Basics for Future Space Development and Utilization."[xli] The report set out the objectives and priorities of Japan's space policy, as follows:

<u>Objectives:</u>

1. Development of Knowledge

2. Advancement of economy and society
3. Ensure safety
4. Promote sustainable development
5. Improve people's quality of life

Key priorities:

1. Satellites (Security and Crisis Management, Communication and Positioning, and Earth-observation)
2. International Space Station
3. Strategic Expansion of Space Utilization
4. Launch Vehicles

This report, for the first time for a Japanese space policy document, referred to the necessity of utilizing space to collect information so the government can respond not only to natural disasters, but also to other national security concerns in a timely manner. The Council's decision to chose to use the word "security (*anzen hosho*)" is an epoch-making episode in the history of Japanese space policy, as this is the first formal recognition in Japan of the significance of space in national security affairs. Japan must continue to adopt its space policy to reflect new realities by periodically reviewing this document.

Recommendation #6: Share Best Practices and Implement System Linkages for Key Technologies that Improve Regional Security

Parallel to the negotiation of a new framework, the two countries should deepen their interaction at the operational level. Chapter 2 looked at three important issues in the US-Japan space policy relationship today: launch vehicles, remote sensing, and navigation satellite systems. In each of these areas, cooperation between the two countries promotes positive security and commercial benefits.

In the area of remote sensing, the two countries have longstanding processes to share space imaging. With Japan's launch of autonomous space imaging capability and the recent decision by the US administration to relax its control on private sector imagery, these relationships should be strengthened, to ensure that the addition of sources does not diminish the incentives for collaboration and information-sharing. The two countries should strengthen their links and create a jointly-staffed, real-time clearinghouse for imagery in East Asia.

One area where Japan's remote sensing capabilities are currently insufficient is data analysis. Japan has only several hundred trained satellite imagery analysts, in comparison with several thousand in the United States. The United States should offer Japan access to U.S. training programs for imagery analysts on a remunerative basis. This knowledge transfer would allow Japan to play a more responsible role in the region and would be a form of burden-sharing that reduces U.S. monitoring costs.

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In the area of navigation satellite systems, the United States and Japan should continue their ongoing efforts to harmonize GPS and the planned QZSS, and begin discussions about the integration of next-generation satellite navigation systems (GPS Block III, any follow-on regional upgrade to QZSS). Discussions should be held at both the policy level—between the Interagency GPS Executive Board (IGEB) in the U.S. government and Council for Science and Technology Policy in Japan—and at the operational level—between the DOD's GPS Joint Program Office (JPO) and whichever government entity ends up with operational responsibility for the system in Japan. The goal of these interactions is to harmonize the countries' satellite navigation system capabilities and decrease the potential for resource inefficiencies in both countries. This will ensure that the two systems achieve the maximum commercial value, create cost-savings, and preserve or extend U.S. and Japanese security.

Conclusion

The U.S.–Japan relationship in many respects is enjoying its most stable period in decades. The two countries are working together closely on security issues such as North Korea, the war on terrorism, and ballistic missile defense. Support for the alliance is at record highs in both countries. Discontent among the Japanese public with the American military presence in the country is muted at present. The heated, often acrimonious trade disputes of the 1980s and early 1990s seem a distant memory. The personal relationship between President Bush and Prime Minister Koizumi is strong.

But there is no guarantee that new issues will not emerge to test the relationship's recent solidity. Accidents or incidents involving U.S. forces stationed in Japan, or unexpected events (akin to the *Ehime Maru* incident), could occur and rekindle latent resentments. Politicians in either country could blame their poor economic performance on the other, and trigger a new round of protectionist behavior. The two countries could diverge in their opinions on the appropriate response to an incident on the Korean peninsula.

Given these uncertainties, now is the time to lock in the gains of a strong U.S.–Japan alliance, by strengthening and renewing the institutions, frameworks, and channels of interaction and cooperation that are the bulwark of the relationship. Space policy is one area where such attention is due, and it is our hope that the United States and Japan will move forward in the near term to develop a new governing framework for the bilateral relationship, and take the additional specific steps that will ensure that both countries continue to make positive and stabilizing progress on international space policy.

Endnotes

[i] See Logsdon (1997) for a detailed treatment of this early history.
[ii] "Non-R&D" in this case refers primarily to commercial satellites.
[iii] Figures from Office of Management and Budget, "Analytical Perspectives, Budget of the United States," Fiscal Year 2004, p. 483, at http://www.whitehouse.gov/omb/budget/fy2004/pdf/spec.pdf; and Congressional Research Service, IB 92011, "U.S. Space Programs: Civilian, Military and Commercial," Updated April 22, 2003.
[iv] Ibid.
[v] Formerly the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD C3I).
[vi] See annual "Aeronautics and Space Report of the President" for additional details on U.S. space activities by agency. http://www.hq.nasa.gov/office/pao/History/presrep.htm.
[vii] Report available at http://www.defenselink.mil/pubs/space20010111.html. See General Accounting Office, "Defense Space Activities: Organizational Changes Initiated, but Further Management Actions Needed," April 2003, for a progress report on reform of DoD's space activities.
[viii] See National Space Policy Review Directive / NSPD-15 at http://www.ostp.gov/html/02_7_15_2.html
[ix] See Aerospace Daily, "Japan to spend $2.5 billion for space program in FY 2002," March 7, 2002. Yen figure for NASDA budget is 154.5 billion yen, cited at Ministry of Finance, Japan. "Understanding the Japanese Budget." http://www.mof.go.jp/english/budget/brief/2002/2002-12.htm.
[x] Ibid.
[xi] Ibid.
[xii] Ibid.
[xiii] A fact sheet on the CSTP (including information on its membership) is available at http://www8.cao.go.jp/cstp/english/leaflet.pdf
[xiv] For example, consider the controversy in August 2001 over Prime Minister's Koizumi to the Yakusuni Shrine.
[xv] See The Economist, "The Axis of Good," May 3, 2003; also David Asher, "Could Japan Become the 'England of the Far East'," American Enterprise Institute, June 1, 2001.
[xvi] See Agence France-Presse, "Japan enacts military contingency laws," June 6, 2003. Available at http://www.spacewar.com/2003/030606075828.kbi2md0g.html
[xvii] Testimony available at http://govt-aff.senate.gov/052003nkoreagov.htm
[xviii] See Japan Times, "Yakuza cash is funding Pyongyang's WMD: US," June 6, 2003. http://www.japantimes.co.jp/cgi-bin/getarticle.pl5?nn20030606a1.htm
[xix] See http://www.nasda.go.jp/projects/rockets/h1/index_e.html.
[xx] The Space Shuttle is technically also a RLV.
[xxi] Cited in Marcia Smith, "Space Launch Vehicles: Government Activities, Commercial Competition and Satellite Exports." Congressional Research Service, #IB93062. May 30, 2003.
[xxii] Remote sensing in this report is broadly defined, encompassing the range of sensing modes including visible (optical), infrared, and microwave.
[xxiii] Plans were underway for an independent reconnaissance capability prior to the Taepodong missile launch, but only gained momentum and broad political support after this event.
[xxiv] BBC News, "Analysis: Japan's Spy Satellites." March 28, 2003.
[xxv] Quoted in Associated Press, "N. Koreans Call Japan's Spy Satellites a Hostile Act," March 29, 2003.
[xxvi] Available at http://www.ostp.gov/html/new.html
[xxvii] Japan Economic Newswire, "Japan's Spy Satellites Inferior to U.S. Commercial Ones," December 28, 2002.
[xxviii] See recommendation #5 in Chapter Four.
[xxix] There are two key types of navigation satellite systems: global (GNSS) and regional (RNSS). GPS is an example of the former; QZSS is an example of the latter.
[xxx] European Commission fact sheet on Galileo makes argument that GPS coverage is spotty at extreme latitudes. See http://europa.eu.int/comm/dgs/energy_transport/galileo/doc/galileo_info_note_2002_03_26_en.pdf
[xxxi] Asiaweek, "Hit the Road, Chip." February 23, 2001.

[xxxii] GPS World, "QZSS - Japan's new integrated communication and positioning service for mobile users." June 2003.
[xxxiii] Ibid.
[xxxiv] See GPS World story (cited above) for detailed information on the technical standards for QZSS.
[xxxv] Asahi Shimbun, "High Stakes / Space Race." February 22, 2003.
[xxxvi] Asahi Shimbun, "High Stakes / Space Race." February 22, 2003. Also ASBC website at http://www.asbc.jp/indexE.html.
[xxxvii] Asahi Shimbun, "High Stakes / Space Race." February 22, 2003.
[xxxviii] See Joint Announcement, 2nd Japan-U.S. GPS Plenary Meeting. http://www.igeb.gov/japan-announcement-2002.shtml
[xxxix] See, for example, Asahi Shimbun poll, May 2, 2001, at http://www.kanzaki.com/jpoll/2001/; Agence France Presse, "54 percent want pacifist constitution changed: Japanese poll," April 2, 2001, cached at http://216.239.51.100/search?q=cache:6_0ECygNh_cJ:asia.news.yahoo.com/030402/afp/030402112605int.html; and Yomiuri Shimbun poll, released on April 2, 2003, at http://www5e.biglobe.ne.jp/~kenporin/sinbun/f15.htm
[xl] A National Space Council was established by the first Bush administration in February 1989. See http://caselaw.lp.findlaw.com/casecode/uscodes/42/chapters/26/subchapters/ii/sections/section_2471.html
[xli] Original document (Japanese) can be found at http://www8.cao.go.jp/cstp/output/iken020619_5.pdf. English translation is not available at the time of writing this report.

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