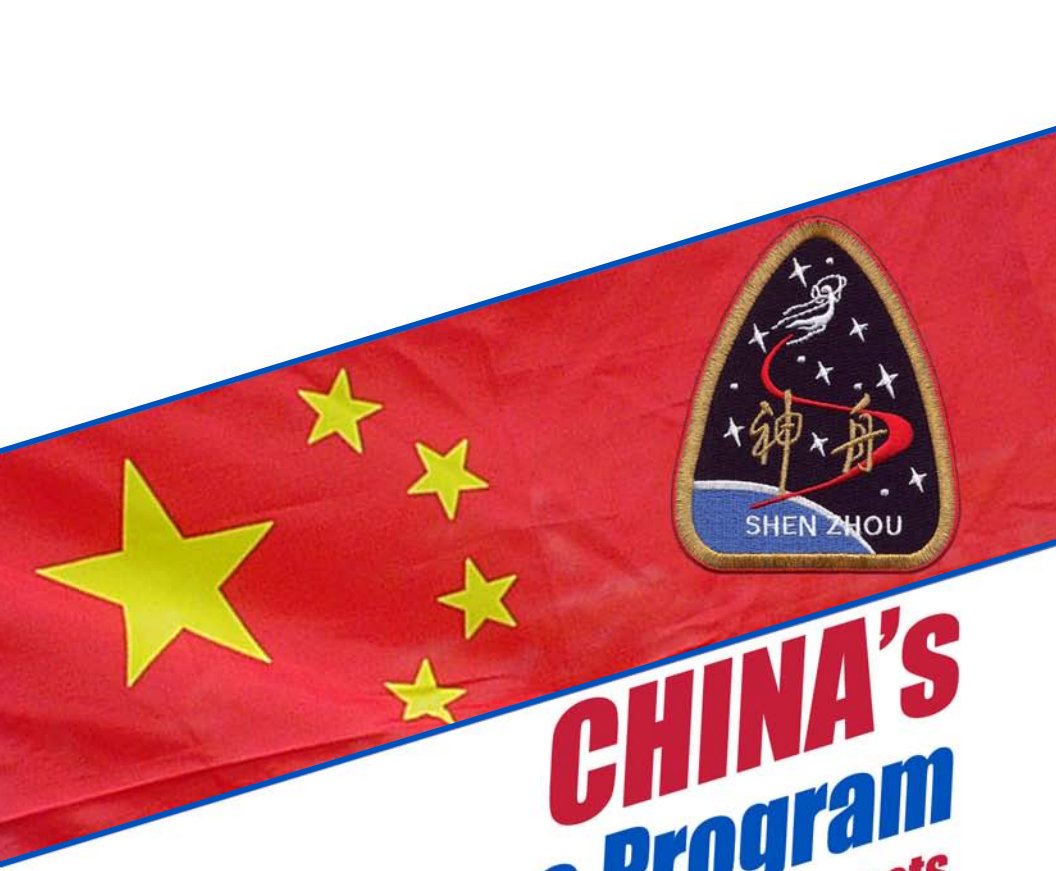

CHINA'S Space Program

Civilian, Commercial, & Military Aspects

A CNA Conference Report

Conference Director:
Dean Cheng

CNA

PROJECT ASIA

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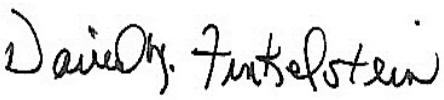

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CHINA's Space Program

Civilian, Commercial, & Military Aspects

Forward

Dr. David M. Finkelstein
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An important and under-reported outcome of the April 2006 visit to the United States by PRC President Hu Jintao was his acceptance of an offer by President Bush to have NASA Administrator Dr. Michael Griffin visit China in the fall of 2006. According to US officials, the purpose of the visit will be to open a dialogue to explore the potential for cooperation in space—to include, perhaps, cooperation on lunar exploration. This is a significant and surprising development.

It is a significant development because China's space program is moving forward year-by-year. And as this conference report underscores, there is all too much that is imperfectly understood in both the US government and the private sector about the objectives, the capabilities, or even the range of institutions involved in the PRC program. A bilateral dialogue on space would go a long way towards lifting some of the veils that obscure China's space program.

It is also a surprising development. Space programs are often seen as the crown jewels of a nation's technological development. It involves some of the most sensitive military and defense technologies, as well as proprietary commercial and civilian capabilities. Even among allies, space cooperation involves extended and complicated negotiations. A decision to put a Griffin visit to China on the Bush-Hu summit agenda, given the range of commercial and security issues that continue to bedevil US-China relations, is extraordinary. Not surprisingly, White House officials have intimated they encountered some resistance to such a visit in some quarters of the US Government. We can only speculate as to Beijing's reactions to such a proposal, given the Chinese military's role in their space efforts.

Our October 2005 conference placed the prospects for space cooperation on the agenda as one of many issues for discussion. At the time, the experts assessed that the prospects for cooperation in space between the US and China were "limited" at best. They may well be proven correct in their assessment. Time alone will tell. Those who follow US-China relations understand all too well that the road from an initial high-level visit to actual programmatic cooperation is a long one, fraught with many political obstacles, bilateral and domestic. But the fact that a Griffin visit to China is now on the table opens the door to this possibility. This offer by the Bush administration also indicates how quickly things ***can*** change in US-China relations. A mere five months ago the space-watching community assessed that there was little evidence to suggest that either Washington or Beijing was interested in such a dialogue.

Project Asia at The CNA Corporation will continue to track China's space program as well as developments in US-China space cooperation. The visit to China by NASA Administrator Griffin, coupled with China's aspirations to begin launching lunar probes by next year, will certainly make 2006-2007 a fascinating period for those who follow space issues in general, and the PRC space program in particular.

It is our hope that this conference overview will be useful to experts and those interested in understanding some of the fundamental issues associated with the PRC space program and its implications from a national security perspective, a commercial perspective, and as an issue in bilateral relations.

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Executive Summary

On October 26, 2005, The CNA Corporation hosted a conference on the Chinese space program. This conference, held days after the launch of China's second manned space mission, Shenzhou-VI, provided an opportunity for different government, academic, and business communities with a shared interest in China's space program to come together and exchange views and insights. The conference included specialists from the US Government (including both civilian and military agencies), representatives of the space industry, and China experts from both inside and outside the Government. The conference provided a much-needed venue for these various communities to expand the dialogue on the status and implications of China's space program. Discussions of these issues led to themes on which conferees generally concurred. Others led to questions that elicited disagreement among the conferees.

Points of Agreement

For both the United States and the People's Republic of China (PRC), space is seen as an essential area of interest.

The United States relies upon space for a variety of commercial and military ends. One speaker characterized the PRC's view of its space efforts as embodying a "return to greatness."

At the same time, however, resources devoted to exploring space are under increasing constraint.

In reviewing space programs worldwide, it was noted that most space budgets are static, if not shrinking. Few nations are devoting more resources to space. Even the United States, which spends substantially more on space programs than any other nation, has seen only limited increases in its space budget.

Given the resource limitations, many nations are seeking to maximize their returns on space-related investments.

In the case of the PRC, this has involved the "three Bs": Building, Buying, and Borrowing. The PRC has generally relied upon indigenous development (building), supplemented in some instances by covert acquisition and exploitation of other nations' open sources. In a few instances, China has also sought to buy foreign technology to support those areas that it could not build or otherwise acquire.

The constraints on space budgets have also led a number of nations to expand their participation in international space efforts, in order to leverage synergies and avoid redundancy in sunk costs.

The United States and the People's Republic of China, however, have been notable exceptions to this trend.

One speaker noted that joint development efforts with the United States are viewed as increasingly problematic due to export restrictions and International Traffic in Arms Regulations (ITAR) legislation. These regulations often prevent transfers of key technology, even to the joint development partners. Furthermore, potential foreign partners are concerned that American political decisions may lead to US efforts to impose restrictions on sales of these jointly developed satellites to third parties, and that such restrictions would result in lost sales. It was noted that the French company Alcatel had developed an "ITAR-free" satellite, "meaning that no components of US origin were used, and so the satellite was not subject to US export laws." US firms were not allowed to bid on this contract. Further complicating the situation, several speakers observed that American military leaders' comments concerning future space warfare have led some to identify the United States more with Darth Vader than with Luke Skywalker.

Nor was it clear to many of the speakers how interested the PRC is in expanding its participation in international space efforts. This is partly due to the generally opaque nature of Chinese programs. In particular, conference speakers and

attendees generally agreed that China is not forthcoming with information about its efforts in space, including such basic issues as its spending and its programmatic objectives. Given the apparent integration of military and civilian decision-makers in the Chinese space program, this makes many potential foreign partners wary of engaging in cooperation (especially given the limitations imposed by the United States on technology transfer to China).

There are limited prospects for US-PRC space cooperation at this time.

There was extended discussion on this issue, but the general tenor of the discussions was that the prospects of such cooperation as of October 2005 are limited. Several speakers suggested that any kind of US-PRC space cooperation would have to be part of a fundamental change in relations at the strategic level. That is, there would be significant cooperation between the two nations' space programs only if they were integrated into a broader, overall improvement in bilateral relations.

This situation was attributed in part to the fact that Chinese and US decision-makers lack common terms of reference. There was a general consensus among the conferees that neither Chinese nor American decision-makers necessarily understand their counterpart's perspectives and constraints. Even if there were cooperation between the two sides, it would exist entirely in the realm of civilian space efforts; while some conferees suggested a few possibilities for military space cooperation, there was little evidence suggesting that either the US or the PRC intend to pursue such measures.

Questions Eliciting Disagreement

What is causing the erosion of US commercial technological leads?

One area of disagreement was whether the United States will be able to retain its technological lead in space. Conferees seemed to share the view that American military space systems remain substantially ahead of those of other nations, but several cautioned that American commercial systems were no more than a

generation ahead of European systems, and perhaps no more than on a par with them. There was no consensus as to the reasons behind this erosion of US commercial technological capability, although several speakers suggested that export controls were limiting the resources available to commercial vendors for R&D purposes.

How far along is the PRC in space, and where is it headed?

Another area of disagreement was future Chinese space capabilities. Some speakers suggested that the PRC is intent on developing a space-based intelligence-gathering system comparable to that of the United States. Others expressed the opinion that the PRC would retain a focus on dual-use systems, stressing launcher development over satellite fabrication. It was even suggested that the reason the Chinese are focusing on launch capabilities, rather than satellites, is that their satellite manufacturing capabilities are so poor.

How should the United States view the Chinese space program?

These different views of US and Chinese capabilities, as noted above, led to a basic difference of opinion as to how the United States should formulate its policies regarding China's space program. While conferees generally agreed that any change in space cooperation would have to be the product of a broader improvement in bilateral relations, there was little discussion of whether any such change was likely to occur. At the same time, conferees generally disagreed as to whether greater space cooperation is necessarily desirable. There was significant debate on the impact of technology transfer restrictions (e.g., does restricting technology transfer promote indigenous development?) and whether the Chinese interest in "asymmetric warfare" can be equated with an interest in space warfare capabilities.

What should be the aim of US-PRC cooperation in space?

Finally, conferees did not agree on what the aim of any cooperative efforts should be. Among the potential goals suggested were:

- Keeping the Chinese space program focused on peaceful ends
- Gaining insight into Chinese space efforts and making them less opaque
- Making the Chinese become stakeholders in the international space system
- Providing a point of leverage from which to influence Chinese decisions in other areas (e.g., Taiwan)

Conferees did not agree, however, on whether any or even all of these goals were sufficient to support a policy promoting US-PRC cooperation in space.

Overview

On October 26, 2005, The CNA Corporation hosted a conference on the Chinese space program, which sought to provide more insight into China's efforts towards exploiting space. This conference brought together specialists on space from the defense community, civilian agencies, and space industry, as well as China experts, in order to expand the dialogue among these various communities to discuss various aspects of the Chinese space program.

The conference opened with an introduction which noted that there are, in fact, two Chinas: a "rising China" with growing national strength; and "the other China," which is confronted by growing domestic problems that, if left unresolved, could lead to increased social instability with potentially regime-threatening consequences. The Chinese space program is emblematic of the former China. US security analysts view the program with some degree of concern, because not much is known about China's goals, while civilian and commercial specialists see it as both an opportunity and a challenge.

This was followed by six presentations that examined China's space program from a number of viewpoints, including those of the overall international space community, the US Government, and the US commercial sector, and from the perspective of the United States as a military competitor and as an arms control partner.

Presentations

"Key Players and Developments in the International Space Community"

The first speaker delineated the state of national space programs worldwide, in order to provide some greater context for the rest of the conference. As the speaker noted, there is currently a high level of uncertainty regarding funding and project objectives in most countries' space programs. While most observers and analysts agree that space-based systems are of increasing commercial as well as military interest, the level of resources being devoted to these efforts is subject to the vagaries of national budgeting processes. This uncertainty is exacerbated by the fact that global policy-makers lack a clear vision of, or policy on, the role of space. The speaker observed that even after five decades of space exploration and exploitation, many governments and publics are still asking, "What are we getting out of this?"

The situation is further complicated by the evolving relationships between the various space-faring states. On one hand, there is growing interest in more multilateral space efforts. For example, two days prior to the conference, Russia and the EU announced plans to expand their cooperation in space development. At the same time, many states worry about the future of US space efforts and the likely impacts of those efforts upon them, as the United States operates as a "space hyper-power." Indeed, one theme of the opening speaker's remarks, and of the conference in general, was that the United States is the largest, most important space power, with the widest array of capabilities and greatest financial and technological resources devoted to space. US decisions affect space programs worldwide. In space policy, all roads eventually lead to Washington.

The preeminence of the United States can be seen in comparisons of various nations' spending and resource commitments to space. Nearly 60 cents out of every dollar spent globally on space is spent by NASA. The US military space budget similarly outpaces that of the rest of the world. As a reflection of its national commitment to space, the United States dedicates more money per capita toward

space than any other nation. Of the world's top five space organizations (in terms of spending), three are American: the Department of Defense, NASA, and the National Oceanic and Atmospheric Administration (NOAA).

After the United States, the next major player in space is Europe. It has the second largest space budget in the world. The first speaker suggested, however, that the prognosis for the European space program appears to be somewhat problematic. Space analysts have growing doubts about whether there will be a substantial EU-wide space effort, especially since the rejection of the EU constitution may have stalled momentum towards cooperation.

Japan is the third major space power, with the third largest space budget and the fourth largest space organization. But the Japanese program has suffered several prominent failures, however, such as the loss of two intelligence satellites last year. The result has been questions about quality control and a general crisis of confidence in the space program. The Japanese appear intent on reversing this situation, however. The Japanese Aerospace Exploration Agency (JAXA) has promulgated an ambitious plan for future efforts. The first speaker predicted its approval, and forecast a possible 13 per cent increase in the JAXA budget for next year.

The first speaker also discussed several other major space players: Russia, which is developing a new family of space launch vehicles, including the Klyper, and has indicated an interest in beginning a new series of missions to Mars; India, which is expanding its range of space capabilities, and is intent upon launching a robotic mission to the Moon; and Brazil, which has long had significant ambitions but also has had a number of disappointments, including the recent failed test of a new launch vehicle.

Less clear is China's position relative to other players. It was noted that China's official space budget would place it on par with South Korea in terms of spending, but that few experts believe that these figures represent the entirety of Chinese civilian space spending. The Chinese military space budget is similarly opaque.

Another key area addressed by the first speaker was that of commercial satellites. It was noted that, as the telecom industry has stopped growing by leaps and bounds so has demand for new satellites. This has produced a squeeze in the commercial launch sector, as well as in the satellite manufacturing arena. The main area of growth in the commercial satellite sector is that of satellite applications and services, rather than satellites themselves. In particular, direct-to-home satellite TV appears to be a major driving force now in the satellite industry.

"China: An Emerging Player in Space"

The second speaker's remarks focused primarily on the state of the Chinese space program. China was described as being constrained by the state of their economy (echoing the opening remarks about "the other China"), so that most of China's space efforts have focused on high-return activities and thus have resulted in a number of unique programs and projects. As a result of this focus, the speaker suggested that Beijing does not currently possess a structured, coherent military space program.

The speaker noted that the Chinese program has benefited from using a three-pronged approach of "borrowing, building, and buying."

In terms of "borrowing," the speaker noted that although the Chinese engage in espionage and illegal acquisition, they also have a long history of copying and reverse engineering other nations' products. In this regard, they are aided by the growing cadre of Chinese engineers and scientists. It was also noted that in such areas as remote sensing satellites and small satellites, China has formed useful partnerships with other countries and organizations, and has used joint ventures to improve its own capabilities. Consequently, the speaker implied, we should see that PRC "borrowing," not primarily as a matter of covert or illegal technology transfer, but rather as a broader effort to exploit available information and technologies.

In this regard, the speaker pointed out that the PRC devotes substantial resources to acquiring and analyzing open-source information. Indeed, the speaker noted

that many American analysts tend to overly emphasize the espionage component of "borrowing," which actually may be the least important element of the Chinese technology development effort. Instead, the Chinese appear to be devoting substantial human resources to exploiting publicly available material.

In addition to "borrowing," the Chinese are also engaged in "building." As the speaker pointed out, the Chinese developed much of their early space program indigenously. They developed not only their own launchers, but also their own communication satellites, meteorological satellites, and navigation satellite constellations.

In the speaker's estimation, the Chinese have also "bought" significant capabilities, particularly when indigenous technology development would have cost too much and/or taken too long. For example, the Chinese have tried to purchase remote sensing technology from foreign suppliers, including the United States, European countries, and Russia. However, the Chinese generally would appear to prefer indigenous development, in large part because they recognize that true innovation requires understanding the science behind the technology.

The Chinese have indicated that they are interested in developing their space capabilities in a steady, step-by-step manner. The ongoing manned effort reportedly comprises three phases:

- Phase I—a technology demonstration phase
- Phase II—docking, maneuvering, and extra-vehicular activities (EVA), such as a space-walk
- Phase III—the construction of a small space station, which may involve a new launcher

In the speaker's estimation, the Chinese want to use their manned space program as a means of telling the world that they make more than cheap, low-tech items. That is, they practice a form of "techno-nationalism," with the aim of inspiring students to continue in math and science programs.

"Commercial Views of China's Space Program"

The third speaker discussed the impact of China's space program on the US satellite industry. The speaker noted that the current US satellite industry has some $97 billion in business, including launch services, satellites, and services. Satellite-related businesses include not only navigation, communications, broadcasting, and broadband, but also remote sensing and support services such as insurance.

The speaker suggested that, globally, there is a market for about 50 satellites annually, but that this can vary widely—for example, only four satellites were launched in 2002. As reliance on satellite communications grows, however, this may expand.

The satellite business is divided into three sectors: direct broadcast services (DBS), fixed satellite services (FSS), and mobile satellite services (MSS). DBS, which is the fastest growing, most substantial portion of the satellite business involves the direct broadcasting of satellite feeds to homes. FSS includes transponder leasing and remote sensing, while MSS includes mobile phones and data services. FSS has not grown as much as expected, especially in Asia. This, in turn, has been a factor affecting the satellite market.

One issue of growing concern, the speaker noted, is that an increasing proportion of military traffic is passed through commercial satellite systems. The implications of this, whether for jamming or for hard-kill of satellites, are unclear. Similarly, the speaker noted that it is uncertain what responses might ensue if a commercial satellite were to suffer from third-party jamming, especially if that third-party were a non-state actor. This may be a substantial issue in future conflicts, since one of the largest satellite owners in the world is a commercial entity—i.e., the company formed by the merger of Intelsat and PanAmSat.

Another issue was that of balancing the potential Chinese market with the Chinese Government's restrictions. One example cited was China's use of financial and other incentives and pressures to get satellite broadcasters to cease transmitting

New Tang Dynasty programming.* Such pressures are exacerbated by Chinese restrictions regarding foreign access to the PRC's space market. The Chinese are, for example, very protective of their orbital, and especially their geosynchronous, slots. In terms of business practices, Beijing will often impose excessive regulatory fees on foreign corporations, and will also require them to have local Chinese partners. The speaker also noted that the Chinese Government systematically prefers local providers over international competitors. This speaker echoed others by describing the Chinese as very opaque in their decision-making.

The situation is complicated by the extent to which the United States itself also lacks transparency, especially in terms of its export restrictions. The United States has often sought to restrict sales of items that are, in fact, widely available. The speaker noted that this is especially problematic since the United States does not tier its sales, but instead treats all foreign buyers, from Canada to China, in the same way. As a result, many potential foreign customers and satellite designers are wary of the vagaries of US policies. Indeed, Alcatel already has produced a satellite with no components that might be subject to US ITAR (International Traffic in Arms Regulations) restrictions—a situation that the speaker cautioned may become more common in the future.

Consequently, the speaker suggested that the US satellite industry is currently focused on the broader issue of US technology transfer guidelines, rather than on the China case alone. The aim is to improve safeguards for the key technologies, rather than to pursue blanket rules and regulations that make few distinctions between allies and other parties. In addition, industry is ambivalent about "Buy America" provisions and many corporations and key players are actually opposed to them. The speaker indicated that industry as a whole is trying to educate policy-makers on these issues, but that it will not undertake a specific push with regards to sales to Beijing until it sees what direction policies take on China.

* New Tang Dynasty TV (NTDTV) is a New York City-based TV station that broadcasts a variety of programs. The PRC Government has claimed that NTDTV is affiliated with Falun Gong. Its programming is at variance with Beijing's state-sponsored news programs.

"US Government Views of China's Space Program"

The fourth speaker noted that the US Government generally does not view space cooperation with China as a "front-burner" issue, but it has often been raised as a "back-burner" issue, often arising in the course of discussing overall US-PRC relations.

The speaker noted that there is a broad consensus among various stakeholders within the US Government that the PRC is engaged in a broad, deep, indigenous effort to develop its space capabilities. Moreover, many in the US Government view this effort as being driven by military, rather than commercial or economic, concerns. In the view of many of these stakeholders, the PRC's ultimate aim is to develop a space-based intelligence-gathering capability, analogous to that serving the US military. This estimate is made more problematic by the opacity of the Chinese program, which the speaker noted may be even more opaque than the old Soviet space effort.

The fact that the Chinese appear to be pursuing this as part of a long-term effort is seen as especially worrisome, since it is quite possible for China to catch up with the United States in, for example, a 20-year time frame. In this regard, China may be seen as an indirect motivator, pushing the United States to undertake a more active space development program, for fear of falling behind in the face of future challenges from the PRC.

China's interactions with foreign partners are seen as a component of this long-term effort. This involves not only direct transfers of technology and joint development programs, but also efforts to learn foreign methods and techniques—which are often viewed as being as valuable as the technology itself. In the case of the 1998 Loral-Hughes controversy, for example, it was suggested that the Chinese may have gained more from watching how these companies went about investigating the failure than they did from examining the final report on the failure itself.

In discussing the prospects for joint US-PRC space cooperation, the speaker suggested that US policies with Russia and India might serve as models. When Washington initiated space cooperation efforts with Moscow, Russia's space

program had already developed significant capabilities. Washington knew that those capabilities, if uncontrolled, might greatly complicate global efforts at limiting proliferation—but that those same capabilities would complement US space development efforts. Consequently, the United States both purchased Russian engines and compensated Russia for lost commercial opportunities. US-Russian cooperation, however, did not begin until after the Soviet Union collapsed, when a new political context defined bilateral relations.

In the case of India, cooperative efforts did not commence until after 9/11, when US decision-makers felt that the overall strategic situation had fundamentally changed. Consequently, the United States shifted its stance from generally avoiding discussion of joint space cooperation to welcoming greater interaction between the two nations' space efforts. But because there have been fewer quid pro quos possible between the United States and India, cooperation has also been more limited. India, for example, has not been invited to be part of the International Space Station (ISS).

Given these possible templates, the speaker suggested that space cooperation between the United States and the PRC would likely have to be the result of a "grand bargain" between the two nations. That is, any major joint space effort, comparable to the Apollo-Soyuz joint mission, would have to be part of a larger set of exchanges and joint efforts that went beyond the space arena to the broader strategic relationship. As the speaker noted, given the scale and public visibility of space efforts, any such cooperation would have to be perceived as generating a significant benefit, or marking a major breakthrough in relations.

This raised the question, "What should be the goals of any cooperative venture between the United States and China?" The speaker suggested that one goal would be to keep the Chinese space program focused on peaceful ends. Another would be to gain additional insights into China's space efforts, including the players involved, their goals, and their decision-making process.

Yet another aim should be to integrate key Chinese decision-makers into the international space system, so as to raise the costs of Chinese violation of international norms.

The speaker concluded by noting that the United States and China can cooperate on multiple levels—e.g., they can work together to develop joint scientific space missions, commercial efforts, and eventually even human spaceflight. But a joint lunar program would almost certainly be the crown, rather than the opening gesture.

"China's Military Space Doctrine"

The fifth speaker focused on China's military interests in space. The speaker observed that it is not currently known whether the PRC has a military space doctrine, but that Chinese military writings have recurring themes regarding the importance of space. These are likely to be elements of any future Chinese military space doctrine, if there is not one already.

One such theme is the importance of securing information dominance. According to the speaker, Chinese writings suggest that failure to achieve this dominance makes victory unlikely. As a result, PLA writings focus on the need to use information derived from space-based platforms, while denying such information to opponents.

The speaker noted that PLA writings describe information technologies as having played an essential role in recent wars. These writings emphasize that the Americans' ability to use a combination of space and airpower has allowed US forces to completely dominate their opponents; consequently, PLA analyses conclude that space technology is crucial to the ability to obtain and employ information in wartime. Chinese military articles indicate that the current, nascent Chinese concept of military space operations is to exploit space for their own ends, while denying it to their adversaries. The speaker cited one Chinese article, which stated, "The securing of information dominance cannot be separated from space dominance. It can be said, gaining space dominance is the root of winning informationalized war."**

** Li Daguang, "Space Dominance: The Basis for Victory in Informationalized War," ***China National Defense Newspaper,*** [*Zhongguo Guofang Bao]* (January 6, 2004).

According to this speaker, Chinese writings on the importance of dominating space apparently focus as much on "soft killing" as on "hard killing" systems in space—that is, interfering with satellites and their transmissions or striking at terrestrial-based space assets. The overall aim is to deny the enemy information from space-based platforms by blinding and deafening their space systems, and to disrupt navigation satellites.

The speaker also suggested that China is focused more on dual-use technologies than on more military-centered technologies, in order to move forward both military modernization and economic development. In this regard, the speaker emphasized that China's efforts in space should not be compared to US efforts. Additionally, whereas the United States seeks to get inside the decision loops of its adversaries, in order to anticipate their actions and act first, China focuses on damaging and disrupting these decision processes in order to slow its opponents down.

"China and Space Arms Control"

The final speaker addressed the issue of China's interest in space arms control. The speaker noted that an important mode of analysis is the bureaucratic one. Who is in charge of programs? Who manages them? This aspect is often neglected. As an example, the speaker said, while many observers claim that the PLA purportedly runs the Chinese space program (especially the manned space program), they do not provide details on such issues as who is actually in charge of various programs. There is an assumed commonality of interests between the PLA and the State Commission on Science, Technology, and Industry for National Defense, rather than a documented one. This was only one example of the dearth of research on how Chinese individuals and institutions from the military and civilian sides interact and relate to each other. The speaker emphasized the need for more research into this area.

The speaker also questioned whether Chinese interests in space are truly intended to pose an "asymmetric threat" to the United States. Does the Chinese decision-making community believe that such a capability is credible? The speaker

suggested that there are probably competing Chinese interests at work, leading to the analysis that the Chinese space programs develop in much the same way as those of the United States and other major powers. In particular, the speaker drew attention to the fact that the Chinese military industrial complex and the PLA often have competing, rather than complementary, interests and goals.

Despite much recent talk of Chinese development of ASATs, the speaker noted that no ASAT facilities have been publicly identified. The speaker wondered whether this is because such facilities exist but are hidden, or whether it is because they do not, in fact, actually exist. In this regard, it was observed that China is actively supporting efforts to prohibit ASAT technology, and at international negotiations and conferences has generally opposed the weaponization of space.

The speaker further suggested that China's interests in space arms control were linked to preventing further advances in US missile defense capabilities, and that China is more concerned about forestalling US development of an ABM capability (especially one that had space-based components) than about necessarily limiting current space technologies and capabilities.

In light of this, it was proposed that the United States and the PRC might find common ground in stopping the development of ASAT capabilities and promoting mutual transparency. Cooperation in this area would simultaneously protect US assets and help Chinese commercial efforts. Another suggestion was that the United States cooperate with the PRC in developing international norms, perhaps in such areas as orbital crowding and controls on debris. The speaker also raised the possibility of joint satellite tracking and joint development of space surveillance data. Given the American lead in space surveillance, the speaker suggested that the US might forestall Chinese development of an indigenous space surveillance system by sharing such data with Beijing.

Overarching Themes and Undercurrents

Several themes recurred in both the panel presentations and discussions.

Global space spending and space programs in general are not expanding

Despite the substantial commitment of resources, global space spending and space programs in general are stagnant or even shrinking. It was noted that in the United States, for example, NASA's budget is some $5 billion short of what it needs in order to meet its own publicly stated goals. This is likely to entail hard choices between completing the International Space Station, developing a Shuttle replacement, and implementing President Bush's "Vision for Space Exploration." In addition, the US civilian space budget seems to have little prospect for growth. On the military side, there is little excitement about the Defense Department's existing space-development programs—only the Air Force is looking forward to developing new space technologies.

The same trend exists among other major space players. Only India and South Korea are seen as having rapidly growing space programs, at least in terms of year-on-year budget allocations. Other space programs appear to be fortunate if they can maintain their basic budget allocations, despite the range of publicly touted new initiatives.

Such discussions, however, provide only limited insight, given the difficulties of comparing the global players in terms of the burden of their space efforts. One suggestion was to consider the number of satellites orbited by each space-faring nation, as well as their capabilities and applications, rather than focusing on costs and expenditures. It was similarly noted that many nations view their space programs more as jobs programs than as a means of developing "space power."

Multilateral efforts are common in space programs

Another theme was the apparent tendency of many space organizations to seek partners. This appears to be at least in part a reaction to the limited growth in resources allocated to individual space programs. For example, European countries have had a general interest in developing a space capability that goes beyond what they individually can achieve. Similarly, Europe has actively sought to engage Russia for joint EU-Russian space missions. Sino-Russian space cooperation was also cited as an example of multilateralism in space.

This tendency may also partly be due to shared economic and technological factors. It was suggested that both China and Europe are accustomed to pushing dual-use technologies in space and other areas, in order to maximize "bang for the buck." This may prove conducive to future Sino-European cooperation: for example, reports say that a future satellite may involve a Chinese bus with a European instrument package.

Many multilateral efforts exclude the United States

It was also noted, however, that many such efforts often pointedly exclude the United States, which many nations perceive as being more like Darth Vader, than like Luke Skywalker or Han Solo. In this regard, it was observed that the EU has long sought to forge a relationship with the PRC in a variety of areas because of the desire to establish an autonomous political identity. Chinese participation in the Galileo program was therefore described as important to the Europeans---not only for economic reasons, but also because it helped make Galileo a ***political*** counterweight to the American GPS system.

Such efforts are not necessarily translated into actual programs, however. For example, the deadlocked state of the Galileo program and the absence of major new multinational space efforts would suggest the limitations of such efforts to constrain or even balance the US program. Such efforts are likely to be further confounded by the failure of the EU to ratify its constitution, as that indicates fundamental political weaknesses within the EU structure. Furthermore, it was suggested that the Europeans have probably found efforts to bypass or circumvent

US export controls to be more difficult than expected. The only customer for non-ITAR satellites, for example, is the PRC. Nonetheless, several conferees noted that many people in the rest of the world view with suspicion the United States, and see it as intent upon space militarization and weaponization.

The PRC is intent upon developing its space capabilities

At the same time, there was broad agreement among conferees that the PRC is actively developing its space capabilities. This was ascribed to several factors. One is China's burgeoning economy, and the need to improve its basic infrastructure, including its communications system. Participants broadly agreed that if China is to improve its economy, it must develop a world-class communications capability in which space systems play a key role.

Conferees also extensively discussed the potential military elements of China's expanding space program. One suggestion was that, given Chinese emphasis on being able to fight "informationalized wars," the People's Liberation Army may be interested in the ability to exploit space-based platforms to gain information while denying that same ability to likely opponents.

Conferees also discussed the resources that are actually and potentially available to China's space program. It was noted that China produces an enormous number of engineering and science students, possibly as many as 600,000 a year. It was also noted that China dispatches large contingents of space officials, including scientists and bureaucrats, to participate in various programs, including the International Space University. These officials, moreover, are often older and more experienced than their foreign counterparts. Both of these elements indicate that the PRC likely has the human wherewithal to support any planned policy of expanding its space capabilities.

The PRC is not a part of the international dialogue on space

In this context, there was broad consensus among conferees that, although China is interested in expanding its space presence, and while it is engaged in a number

of bilateral efforts, the PRC is not currently an integral part of the larger multilateral space dialogue. Despite some ongoing cooperative ventures by the Europeans and Russians with the Chinese, it was suggested that the PRC is an autonomous player, with no clear interest in becoming more integrated in the broad international cooperative efforts in space.

This assessment was underscored in the various discussions regarding the prospects for US-Chinese space cooperation. There is little interaction between the two sides at the moment. Conferees generally supported the idea that this situation is unlikely to change in the near term.

US-Chinese space cooperation would have to be part of a strategic-level "grand bargain"

Moreover, US-Chinese space cooperation is unlikely to occur on its own terms. Rather, it likely would occur only as part of a "grand bargain" (a phrase that was specifically used) marking a broader, ***strategic-level change*** in US-Chinese relations. This change would require the perception that cooperation would be mutually beneficial—i.e., that the United States would gain something from the Chinese, as well as vice versa. From the US Government's perspective, it was suggested, space cooperation with the PRC is possible only if there is a quid pro quo. That has been a hallmark of both major ongoing US cooperative space efforts: those with Russia, and those with India.

Chinese and US decision-makers lack common terms of reference

When it comes to prospects for mutual cooperation in space, it is not clear whether Chinese and American decision-makers necessarily understand each other's perspectives and constraints. Some of the conferees who have interacted with Chinese space experts observed that the Chinese often assume that US reluctance to engage in joint undertakings is rooted in doubts about Chinese technological sophistication, rather than political issues. Thus, Chinese experts at an April 2004 meeting in Beijing proposed joint space development as a ***means*** of

fostering greater mutual trust and understanding, whereas American attendees at that same meeting emphasized that joint space development could only be a ***result*** of improved relations.

Given that China and the United States lack a mutual understanding of each other's strategic conditions, conferees were generally pessimistic about the near-term prospects of any kind of "grand bargain" that would lead to greater space cooperation. They suggested that such a change in strategy would require a political effort comparable to those undertaken by President Nixon when he opened relations with China, or when he helped initiate the Apollo-Soyuz joint mission of 1976.

Moreover, it was noted by some that Congress is likely to oppose any "grand bargain." Some conferees suggested that Congress would require significant political change in the PRC before authorizing any kind of strategic opening. It was noted that the current level of US-Russian cooperation, which goes beyond simply shaking hands in space, to purchasing Russian engines and other components, could only have occurred with the demise of the USSR. Nonetheless, most of the conferees suggested possible means for improving Sino-US space cooperation, short of a "grand bargain." These included joint scientific experiments and missions, joint sharing of space surveillance data, and joint efforts at setting norms for space behavior. Moreover, while there seemed to be a general consensus that joint cooperation in military space cooperation is unlikely, it was also noted that US-Russian space cooperation has continued despite ongoing Russian research in military exploitation of space.

Source materials are a major concern given Chinese opacity

A major reason for the lack of understanding is the general opacity of the Chinese space program and Chinese policies and policy-making in general. There was broad agreement that the Chinese are not forthcoming in their discussions of program objectives, resource allocation, or decision-making processes, and that it is therefore more difficult to assess the PRC space program, its magnitude, and its goals.

However, the presentations and discussions also made clear that a major concern is the full and proper exploitation of those open-source materials that are available. One question raised was, "Are analysts are taking full advantage of the available materials that are coming out of the PRC?" It was suggested that they may not be, partly due to the relative paucity of Chinese speakers in the United States. In this respect, the United States was compared unfavorably to China, which has a large and growing pool of English-speakers.

Another question raised was, "Even when we examine such materials, how can we determine their credibility and reliability?" Conferees noted two recent incidents, wherein poorly sourced materials were cited in official US Government documents. One was the DoD report to Congress, which for two years cited a Hong Kong website report regarding Chinese "parasite" satellites. The conference speaker said that the entire story had been rooted in an Anhui electronic bulletin board story, with no further evidence supporting it. In another case, a US report cited a Chinese article as indicative of Beijing's interest in ASATs. Subsequent analysis suggested that the translation was problematic, and that the views it expressed were not necessarily authoritative.

Disagreements and Discussions

While conferees broadly agreed on many areas, discussions indicated that some issues have no obvious answers.

Can the United States retain its qualitative advantage in space systems?

One area in which there was disagreement was the extent to which the United States will remain ahead of other nations in space. It was suggested that while US military satellite systems are probably still at the cutting edge of space technology, European commercial satellites may be no more than one generation behind American commercial satellites. The observation was made that European commercial satellites may already be on a par with those of the United States, and that American military satellites may be only ahead by one or two generations.

While no one suggested that the United States is in imminent danger of losing its qualitative advantage, questions were raised about how much of a relative advantage the United States currently enjoys. There was also discussion about whether the United States is likely to be able to sustain its current advantage for the foreseeable future.

What is the importance of prestige in Chinese space decisions?

Conferees also disagreed on the extent to which the Chinese manned space program is driven by prestige. Some suggested that China's manned program is likely to be motivated by the ability to garner prestige. Others, however, suggested that this is merely an assumption, with no evidence that Chinese organizations or decision-makers are actually driven by prestige as an explicit consideration.

This discussion further underscored two broader points mentioned earlier: first, that there are significant gaps in US understanding of Chinese decision-making regarding space, including what the key motivating factors are and what

objectives are being fulfilled; and second, it is unclear whether US analysts are exploiting the available sources and materials to the maximum extent possible.

What future objectives will the Chinese have for their space program?

There was significant disagreement on whether the Chinese are intent on developing a space-based intelligence-gathering system comparable to that fielded by the United States, or whether they will continue to focus more on dual-use technologies that will serve both military and national economic construction objectives. Chinese efforts to develop improved satellite capabilities were seen as supporting both sides of the debate.

It was also unclear where the PRC's priorities lay, and why. While it was observed, for example, that the Chinese are currently focused on building up their launch capabilities rather than their satellite-manufacturing capacity, it was also noted that China had recently completed its first sale of a complete satellite to a foreign buyer (a Dongfanghong-4 communications satellite to Nigeria). In the course of discussion, one conferee suggested that, if the PRC is more focused on launchers than on satellites, it may be because Chinese satellite manufacturing capabilities are so weak that Beijing views such improvements as necessarily a very long term objective.

Similarly, there was some discussion about whether the Chinese are actually focusing on anti-satellite (ASAT) technology, or whether they are more concerned with other aspects of space militarization and weaponization, especially forestalling US development of ballistic missile defenses. Conferees sharply disagreed about whether the PLA is developing an indigenous ASAT capability. At the same time, it was noted that the available information is consonant with the possibility that the Chinese may be interested in simultaneously preventing US development of missile defense capabilities and pursuing a broader counter-space capability of their own.

How should the US view the PRC space program?

At present, it appears that the United States lacks a general policy regarding China's space program. As noted by several conferees, the US and PRC space agencies have very limited interaction; similarly, the two sides' military space programs have little formal relationship. Also, no real "rules of the road" have been established by the two sides.

Conferees did not reach a consensus on how the United States ought to formulate its policies regarding China's space program. The conferees included both those who hoped to see more confidence-building measures and cooperation between Washington and Beijing on space issues, and those who cautioned about China's possible strategic intentions in space.

One conferee cautioned that, in seeking to avoid strategic surprise in space (i.e., to prevent a "space Pearl Harbor"), the United States might inadvertently be creating the conditions in which worst-case fears drive analyses, leading in turn to crisis instability (i.e., a "1914 in space"). At the same time, though, concerns were raised that the PRC appears intent upon securing space for its own purposes, especially in event of war.

Conferees did generally agree that the United States needs to balance the possibility of Chinese preemptive action in space against more negative foreign perceptions of the American space effort. In particular, it was cautioned that some nations view the US as intent upon not only dominating space, but even preventing other nations from using it at all.

Another observation was that it is not at all clear whether US export restrictions on space-related technology (both specifically to the PRC and in general) are effective, or whether they will ultimately prove counterproductive by fostering indigenous development of satellite and other technologies. US political efforts to limit technology transfer, it was suggested, may be doing nothing more than slowing the inevitable osmotic spread of technology. Also, as foreign competitors are

using the American reluctance to sell technology as a reason to develop their own markets and products, short-term security concerns must be balanced against US commercial concerns, and long-term US competitiveness.

Finally, despite the overall agreement that major Sino-US space cooperation could only occur in the context of a "grand bargain," conferees had few suggestions as to how such a bargain might occur, or what it might entail. They addressed the possibility of lower visibility projects, such as joint cooperation in scientific missions or sharing of various types of information (e.g., on space junk), but offered few suggestions of how such measures might be implemented, or even what element in the bureaucracy (State Department? NASA?) should make such proposals. Nor was it clear whether such proposals would be approved by key actors within the US Government, much less by those within the PRC.

Panelist Biographies

Bretton Alexander

Mr. Alexander is Vice President for Government Relations of the Transformational Space Corporation. He joined t/Space in January 2005, following five years as the Senior Policy Analyst for space issues in the White House Office of Science and Technology (OSTP) Policy during both the Bush and Clinton administrations. While at the White House, he played a central role in developing President Bush's Vision for Space Exploration. He also led a review of national space policies with the National Security Council staff resulting in new Presidential policies on space transportation, GPS, and remote sensing. Prior to joining OSTP, Mr. Alexander held positions in the Federal Aviation Administration's Office of Commercial Space Transportation, the Aerospace Corporation, and ANSER Corporation. In the mid-1990s, Brett spent more than a year in Moscow, Russia, facilitating space cooperation. Mr. Alexander holds Master and Bachelor of Science degrees in aerospace engineering from the University of Virginia in Charlottesville, Virginia.

David Cavossa

Mr. Cavossa is the executive director of the Satellite Industry Association, and has been with the organization since 2001, originally as the Director of External Relations. In his current role, he helps coordinate the education, outreach, regulatory and legislative strategies for the commercial satellite industry on a broad range of issues including regulatory issues, trade, export controls, space transportation, broadband, and the protection, planning, and acquisition of commercial SATCOM by the US Government. Before joining the SIA Mr. Cavossa worked at NASA Headquarters, first in the Office of External Relations and then in the Office of Legislative Affairs where he was exposed to a variety of NASA programs and their impact and perception on the American public. Mr. Cavossa obtained a Masters Degree in Science, Technology and Public Policy from the George Washington University (GWU) Space Policy Institute as a Space Policy Fellow. Mr. Cavossa holds a Bachelors Degree in Physics/Astronomy and Political Science from Wheaton College, in Norton MA.

Dean Cheng

Mr. Cheng has spent over a decade studying Chinese and Asian security and economic issues. He is currently a senior research analyst at the CNA Corporation, where he specializes in Chinese military issues, with an emphasis on China's space program. He has written a number of papers examining the military and technology aspects of the Chinese space program, and has spoken at the National Defense University, CSIS, and the Heritage Foundation on the subject. His views on the Chinese space program have been cited in Space.com, *US News & World Report*, and the *Far Eastern Economic Review*. He has appeared on Voice of America, CNN International, the BBC and the CBC. Prior to joining CNA, he was an Asia analyst with Science Applications International Corporation (SAIC), the US Congress Office of Technology Assessment (the International Security and Space division), and the Institute for Foreign Policy Analysis.

Malia K. Du Mont

Ms. Du Mont is a Senior Asia Analyst at the CNA Corporation. She specializes in China-Central Asian affairs and is co-founder of the Internet-based China-Eurasia Forum. She holds a BA in Chinese from Bard College and an MPP in International Security and Political Economy from Harvard's JFK School of Government. She also studied Chinese foreign policy at the Hopkins-Nanjing Center for Chinese and American Studies. Among her various experiences in the China field, Ms. Du Mont directed Chinese Executive Programs at Harvard University and worked at a Chinese television station in Jiangsu. She has also worked in the American Embassy in Beijing and at the American Chamber of Commerce in Guangzhou, and taught English at Zhongshan University.

David M. Finkelstein

Dr. Finkelstein is the Director of Project Asia, the Asian Security Studies Center at The CNA Corporation. Dr. Finkelstein received his Ph.D. in Chinese history from Princeton University and studied Mandarin at Nankai University in Tianjin, China. A long-time student of Chinese and Asian affairs, he is widely published. His 1993 historical monograph, *From Abandonment to Salvation: Washington's Taiwan Dilemma, 1949-50* (GMU Press), was hailed in *Presidential Studies Quarterly* as "blazing a new trail" and "will take an important place in the literature of US-China relations in the mid-20th Century." He is co-editor of two recent *Project Asia* books published by M.E. Sharpe, *China's Leadership in the 21st Century: The Rise of the Fourth Generation* (November 2002) and *Chinese Warfighting: The PLA Experience Since 1949* (March 2003). A retired US Army officer, Finkelstein is a graduate of the United States Military Academy at West Point, the US Army Command & General Staff College, the Army War College, the Army Airborne School and the Foreign Area Officer Course at the JFK Center for Unconventional Warfare and International Military Assistance. He has held command and staff positions at the platoon, company, battalion, and Major Army Command levels. He also held significant China-related positions at the Pentagon and served on the faculty at West Point where he taught Chinese history.

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Ms. Gunness is a Senior Asia Analyst at the CNA Corporation. She has extensive experience studying, living, and working in China. She is a graduate of the Hopkins-Nanjing Center for Chinese and American Studies, and has studied Mandarin at Beijing Capital Normal University and the Harbin Institute of Technology. In addition to superb language skills, Ms. Gunness brings to bear first-hand insights into the commercial, economic, and social dynamics at work in today's ever-changing China. In addition to her years of study on the mainland as a student, she worked as a business consultant in a well-established Shanghai firm. In that capacity she spent several years working and traveling in China, Taiwan, and Southeast Asia. Upon returning to the United States, Ms. Gunness worked as an Asia analyst for the Intellibridge Corporation, and also served as the China Country Manager for the US Trade and Development Agency. She is the co-editor with David Finkelstein of the forthcoming volume, *Swimming in a New Sea: Civil-Military Affairs in a Changing China.* Ms. Gunness holds a MA in Security Studies from Georgetown University's Edmund A. Walsh School of Foreign Service.

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Dr. Joan Johnson-Freese has served as Chair, Department of National Security Studies, at the Naval War College since August 2002. Prior to that time, she was on the faculty at the Asia Pacific Center for Security Studies in Honolulu, Hawaii; at the Air War College in Montgomery, Alabama; and the Director of the Center for Space Policy & Law at the University of Central Florida. Her doctorate is in political science. Within the realm of international and national security studies, Dr. Johnson-Freese has focused her research and writing on technology programs and policies generally, and space programs and policies specifically, including issues relating to technology transfer and export, missile defense, transparency, space and regional development, transformation, and globalization. Dr. Johnson-Freese served on the National Research Council, Space Studies Board, Committee on International Programs; Office of Technology Assessment, US Congress, Advisory Panel for US Space Launch Capabilities Study, 1994-95; and SPACECAST 2020, Board of Advisors, 1993, USAF study. As a media consultant on space she has worked with such organizations as: CBS Nightly News, CBS news specials, CNN, the

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Ms. Kivlehan-Wise is the Deputy Director of Project Asia. Her research interests include: South China Sea and ASEAN issues, Chinese politics and foreign policy, Chinese maritime law, China media reforms, and China's new generation of leaders. She is the co-editor of *China's Leadership in the 21st Century: the Rise of the Fourth Generation*, and the author of chapters in several edited volumes addressing Chinese security issues. She completed her undergraduate work at the State University of New York at Buffalo, holds an MA in Security Policy Studies from the Elliott School of Foreign Affairs at The George Washington University, and is a graduate of the Hopkins-Nanjing Center for Chinese and American Studies, as well as Capital Normal University in Beijing, where she studied Mandarin. Before joining The CNA Corporation she worked for an international non-profit organization directing projects on Chinese and Mongolian affairs. She also spent time in Bosnia working with the Organization for Security and Cooperation in Europe (OSCE) in support of the 1997 municipal elections.

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Dr. Lewis is a Research Fellow at the Center for International and Security Studies at the University of Maryland School of Public Policy (CISSM). His research focuses on the space policy component of CISSM's Advanced Methods of Cooperative Security Program, which is funded by the John D. and Catherine T. MacArthur Foundation. Dr. Lewis is also an adjunct faculty member at American University and a member of the Editorial Advisory Board of the *Bulletin of the Atomic Scientists*. Previously, Dr. Lewis has worked as a Research Associate at the Center for International and Security Studies, as Japan Desk Officer in the Office of the Undersecretary of Defense for Policy, and as Executive Director of the Association of Professional Schools of International Affairs. Dr. Lewis received his PhD in Policy Studies (International Security and Economic Policy) from the University of Maryland, College Park and his BA in Philosophy and Political Science from Augustana College in Rock Island, IL.

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Dr. Logsdon is Director of the Space Policy Institute at George Washington University's Elliott School of International Affairs, where he is also Professor of International Affairs. He holds a B.S. in Physics from Xavier University (1960) and a Ph.D. in Political Science from New York University (1970). Dr. Logsdon's research interests focus on the policy and historical aspects of US and international space activities. Dr. Logsdon is the author of *The Decision to Go to the Moon: Project Apollo and the National Interest* and is general editor of the eight-volume series *Exploring the Unknown: Selected Documents in the History of the US Civil Space Program*. He is frequently consulted by the electronic and print media for his views on space issues, and has written numerous articles and reports on space policy and history. Dr. Logsdon recently served as a member of the Columbia Accident Investigation Board. He is a former member of the NASA Advisory Council and a current member of the

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