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CHALLENGES TO U.S.-RUSSIAN COOPERATION IN THE MANNED SPACE PROGRAM

by

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Contents

Abstract

The U.S. and Russia agreed to merge their manned space program and to partner in a new international space station. This agreement took place in 1993 and politically symbolized the end of the Cold War and a new cooperative relationship between the two countries. Yet, the despite this enthusiastic agreement and the absence of the Cold War, there are still challenges both countries face that must be overcome if the joint space venture is to be successful. These challenges have little to do with space, but are imbedded and interwoven in the U.S. and Russia's political and economic systems. As Russia emerges as an emerging democracy it faces uncertainty politically and economically. This unstable situation, combined with the past and current political situations create new challenges for both the U.S. and Russia to overcome to be successful in the cooperative manned space program.

Chapter 1

Introduction

In 1957, the USSR launched the first man-made earth satellite, Sputnik I. This act initiated the space race competition between the USSR and the U.S. The space race characterized the first decades of the Cold War. The two countries publicly agreed to détente and a more cooperative attitude toward space exploration after the Cuban missile crisis. Despite the publicly announced détente, the U.S. and the USSR's commitment were more rhetorical for "space for peace" than sincerely cooperative.[1] In 1993, with the collapse of the Former Soviet Union (FSU), the U.S. and Russia formally merged their space resources in a cooperative manned space program. This cooperative space program will culminate in a International Space Station (ISS) that will be shared by both the U.S. and Russia, as well as other international partners.

The U.S. and Russia are now participating in shared space station flights using the U.S. space shuttle and the Russia space station, *Mir*. The shuttle and *Mir* space station cooperative efforts will serve as a testing ground for the future joint ventures. The USSR has more operational experience with long-duration human space flight than the U.S. Beginning 1971 and throughout the early 1980s, the Soviet space program orbited and operated six Salyut space stations.[2] The current space station *Mir* has been operational since 1986 and manned since 1989.[3] As part of the 1993 agreement, the U.S. is now

sending astronauts to work with the cosmonauts on *Mir* missions. The first US astronaut, Dr. Norman Thagard christened *Mir* with his participation on a three-month mission in 1995. The reports of the cosmonauts and astronauts trial on *Mir* were extremely favorable, and it appeared that the U.S. and Russia had broken the code on competition and moved into a truly cooperative spirit in the manned space station program.

> With a Russian folk song blaring in the background, U.S. astronaut Norman Thagard floated in the *Mir* space station, March 16, opening a new era of cooperation between former Cold War rivals to pave the way toward a jointly operated station later this decade. . . . He was greeted by a hug and a kiss on the cheek from cosmonaut Helena Kondakrova, along with a traditional present of bread and salt.[4]

Reading this March 1995 *Space News* article, it would be easy to believe that the U.S. and Russia have overcome monumental differences and are working hand in hand in mutual manned space programs. However, while the article presents an accurate picture of cooperation between the professional space astronauts and cosmonauts, it does not the reflect the overall wavering and unsteady nature of the U.S. and Russian cooperation in the space station program, nor the challenges that lay ahead for the two countries.

Notes

[1] Walter A. McDougall, . . . *the Heavens and the Earth*, (New York, NY, Basic Books, Inc., 1985), p. 249.

[2] U.S. Congress, Office of Technology Assessment (OTA), U.S.-Russian Cooperation in Space, OTA-ISS-618 (Washington, DC: U.S. Government Printing Office, April 1995), p. 13.

[3] Microsoft Encarta, "Soviet Stations," Copyright (c) 1994 Microsoft Corporation. Copyright (c) 1994 Funk & Wagnalls Corporation.

[4] William Harwood, "Thagard Joins *Mir* Cosmonauts," *Space News*, March 20-26, 1995, p 3.

Chapter 2

History

To truly comprehend the current U.S. and Russian space station programs and challenges faced by each country, it is essential to review the U.S. and Russian relationship over the last 35 years. The U.S. and the USSR began as arch rivals and competitors in the space program during the Cold War, with both countries using the "space race" to win national prestige and perceived power. When the USSR launched Sputnik I, it appeared to the U.S. that the communist regime was technologically advanced and ahead of the U.S. in the space program. This galvanized the U.S. into immediate action, as its national pride and prestige were on the line.[1]

The space race between the U.S. and the USSR was more than a race for space capabilities and technology. The U.S. plunged into competition with the USSR in the space program in order to maintain its national pride and prestige. This competition was heightened in April 1961 after the Soviet cosmonaut, Yuri Gagarin, conducted his first orbital flight.[2] The U.S. President, John F. Kennedy, felt this second Soviet feat further diminished the U.S. and his prestige. To combat this second-rate image, President Kennedy instituted the Apollo program, designed to land a man on the moon and return him safely to the earth by the end of the decade. While the world was led to believe that space exploration was really his goal, his real incentive was to regain personal and

national image and prestige.[3] That prestige, not space exploration and development, was Kennedy's goal is confirmed by other space experts. Handberg and Johnson-Freese write, "Kennedy's critical choice was his personal and political desire to demonstrate American technological prowess and reassert national morale and prestige in doing so."[4] Yet, despite this fierce competition to retain the image and prestige of the U.S., the President was split between the need for competition and the desire for cooperation.

Both the U.S. and the USSR were making verbal offerings for cooperation that appeared to be more political than sincere. In May 1963, President Kennedy said to the United Nations General Assembly, "Surely we should explore whether the scientists and astronauts of our two countries—indeed of all the world—cannot work together in the conquest of space."[5] However, critics saw this as a posturing move and while President Kennedy spoke boldly to the UN, he did not encourage NASA to pursue the mission.[6]

After President Kennedy's assassination, President Johnson continued the commitment to place a man on the moon. In 1967, the U.S. and the USSR agreed to the UN Outer Space Treaty of 1967. The treaty denuclearized outer space and demilitarized the moon.[7] In July 1969, President Kennedy's commitment to put the first man on the moon was realized when astronaut Neil Armstrong walked on the moon. The President and the American public felt U.S. had regained national prestige and was now leading the space race. During the early 1970's, the U.S. and the USSR's competition in the space race relaxed some as they entered a period of détente. During this period, the U.S. and the USSR used cooperative efforts in space as a symbol of the thawing tension. However, the cooperative space programs were not accompanied by a trusting political environment between the two countries. Thus, space cooperation became a U.S. foreign

policy tool rather than a true commitment to exploration and development of space. The political rhetoric was epitomized when Presidents Richard M. Nixon and Alexei Kosygin signed an Agreement on Cooperation in the Peaceful Exploration and Use of Outer Space.[8] It was also at this summit meeting in Moscow, that President Nixon announced the U.S. and the USSR would dock their spacecraft in orbit.[9] This project was known as the Apollo-Soyuz Test Project (ASTP). This did materialize with the historic Apollo-Soyuz docking in July 1975.[10] "ASTP was widely praised as a symbol of détente, while also criticized at the time as an expensive symbolic gesture that was wasting scarce U.S. space funds."[11] While this looked like the beginning of a cooperative space program between the U.S. and the USSR, it was overshadowed by international politics. Using the cooperative space program as a foreign policy tool, U.S. President Jimmy Carter reduced the joint space activities with the USSR after the Russian intervention of Afghanistan in 1979. Later, in 1981, U.S. President Ronald Reagan allowed the cooperative space agreements and projects to lapse in retaliation to the Russian imposition of martial law in Poland.[12]

After 1981, both countries continued to pursue their individual space programs with limited cooperation. President Reagan made some attempts towards a cooperative simulated space-rescue mission, but the Russians did not reciprocate. In 1986, General Secretary Mikhail Gorbachev opened the exchange with President Reagan for a more expanded cooperation.[13] The Cold War was thawing. President Reagan and FSU President Gorbachev began discussions on space programs and reopened the door to mutual ventures. During the next years there were joint discussions and trial space programs.

In December 1991, the USSR was dissolved. Of the fifteen republics of the USSR, twelve joined to form the Commonwealth of Independent States (CIS). Russia, a member of the CIS attempted to keep the former Soviet space program intact and by forming a CIS space agency. The agency has not been effective as an influential agency and several countries formed their own space agencies. However, Russia inherited most of the FSU space program and is the dominant player in the post-Soviet space program.[14] Russian President Boris Yeltsin continued the initiative to a cooperative space program with the U.S. He held a summit with the U.S. President George Bush and signed a new civil space agreement. For the first time since 1977, the prospect of cooperation in human space with the Space Shuttle and the *Mir* Space Station were discussed.[15] In April 1993 Russian President Yeltsin and U.S. President Clinton held a summit in Vancouver which resulted in an agreement to establish a U.S.-Russian commission on technological cooperation in the fields of energy and space. This commission was to be chaired by Russian Prime Minister Miktor Chernomyrdrin and U.S. Vice President Al Gore.[16] Later in December 1993, the U.S. and Russia formally joined their manned space efforts. They merged the Russian *Mir* space station program and included Russia in the new international space station project with Europe, Japan and Canada.[17] The agreement of the merger were specific.

> The two sides also signed a contract under which the U.S. will pay Russia $400 million over the next four years for space hardware, services, and data. A three-phase program involving the U.S. space shuttle and Russian *Mir* space station will culminate in a permanently manned international space station.18

This act officially combined the U.S. and Russian manned space programs. For the first time in over 35 years of competition, the U.S. and Russia agreed to replace their rivalry with a formal cooperative manned space plan.

Astronaut Thagard's recent journey to *Mir* was an outcome of these negotiations and the merger. This, like with the success of the 1975 Apollo-Soyuz mission, was proof again that the two countries could work together in manned space stations. Even though Russia is no longer the archenemy of the U.S., current political and social issues in both the Russia and the U.S. pose challenges to success of future manned cooperative space flights. These challenges primarily concern relations between the U.S. and Russia. While Europe, Japan and Canada are also partners with the international space station, this paper will focus on the challenges with cooperative manned space activities between the and the U.S. and Russia.

Notes

[1] Roger B. Handberg and Joan Johnson-Freese, *The Prestige Trap*, (Dubuque, Iowa:, Kendall/Hunt Publishing Company, 1994), p.18.

[2] U.S. Congress, OTA, p. 42.

[3] Walter A. McDougall, . . . *the Heavens and the Earth*, (New York, NY., Basic Books, Inc., 1985) pp. 317-319.

[4] Roger B. Handberg and Joan Johnson-Freese, p 43.

[5] John M. Logsdon and Ray A. Williamson, "U.S.-Russian Cooperation in Space: A Good Bet," *Issues in Science and Technology,* Summer 1995, p. 40.

[6] Walter A. McDougall, pp. 394-395.

[7] Ibid, p. 419.

[8] U.S. Congress, OTA, p. 43.

[9] Ibid.

[10] Ibid.

[11] U.S. Congress, OTA, p. 42.

[12] Ibid.

[13] Ibid, pp. 45-46.

[14] US Congress, OTA, p. 27.

[15] Ibid, p. 47.

[16] Ibid.

Notes

[17] John Pike, "Ralpha: A New Space Station is Born . . . But Will It Fly?" *Ad Astra*, January/February 1994, p. 17.

[18] Richard Selzen, "U.S. and Russia Broadly Expand Science and Technology Cooperation, Chemical and Engineering News, 11 July 1994, p. 31.

Chapter 3

Looking At the Challenges

The obstacles that challenge the success of the U.S. and Russia space station program are numerous and interwoven. Trying to separate or categorize U.S. and Russian cooperative challenges is difficult as each challenge interacts and effects the others. Therefore, the best way to view these challenges is to look at them as interconnected parts to the whole picture, or like an interwoven system. The idea of looking at the total whole (known as systems thinking) is opposite of reductionism thinking. Reductionism thinking is when one tries to gain greater understanding of an issue by dividing it into their smallest divisible parts. In systems thinking, one looks from a holistic view, where you gain understanding of the system by seeing how the parts affect the whole. Peter Senge has written on the U.S-USSR relationship from the systems approach. He perceives systems thinking as "a discipline for seeing wholes."[1] He describes a system as "a set of variables that influence each other."[2] He explains that in order to look at systems, one must shift the mind to "seeing interrelationships, rather than linear cause-effect chains, and seeing processes of change."[3] This is similar to the way that Clausewitz looks at war. Clausewitz's doctrine is based looking at the whole picture and its interconnected parts.[4] It is in this context, that the readers should see the U.S. and Russian cooperative

challenges as a set of interconnected variables that affect and influence each other as well as the final result.

Notes

[1] Peter M. Senge, *The Fifth Discipline*, (New York, NY.: Currency Doubleday, 1990), p. 68.

[2] Ibid, p. 72.

[3] Ibid, p. 73.

[4] Michael Howard, *Clausewitz,* (Oxford: Oxford University Press, 1983), p. 24.

Chapter 4

The Challenges

The six major and often linked challenges to the success of the U.S.-Russia space station activities are:

- The political instability and future of Russia
- The economic situation in Russia
- Russia's proliferation of weapons of mass destruction
- The cultural barriers
- The reliability of the U.S. as a partner
- The operational concerns

As each challenge is discussed, it will become more clear how interwoven these challenges are and how any effect on one will have an effect on the others.

The Political Stability and Future of Russia

The stability of the Russian space partnership is directly related to the stability of the Russian government. The Russian government is currently shaky with an uncertain future. *The Current Digest of the Post Soviet Press* provided an encompassing picture of Russia's instability in it's highlighted introduction to an address by Aleksendr Ledbed. In all capitals, it read,

> Lamenting Moscow's 'Incompetence And Weakness' In Chechnya, 'Criminalization' Of The Economy, Citizens' Widespread Despair, Decline In Spirituality, Deterioration Of The Army, Gulf Between People And Rulers, Disunity Of Society, Aleksandr Ledbed Calls For Coalition Of 'Leftist, Left-Centrist And Patriotic Forces'.[1]

A political environment this unstable could lead the Russian people to respond to any leader who promises stability and improvement.

There is much speculation about the future scenarios of the Russian government and its effect on our partnership in space. John Pike writes,

> There are at least two scenarios under which political transformations in Russia could imperil the international space station effort. The political orientation of the Russian leadership could change, leading to Russia's withdrawal from the program. Or political events in Russia could take and unacceptable turn, leading to a Western withdrawal. Continuing a centuries old debate, Russia remains polarized between Westernizers who seek integration with the industrial democracies, and Slavophiles who advocate isolation from and confrontation with the West. With two coup attempts, who is to rule out a third or a fourth, with potentially less pleasant results? In this scenario, Russian President Boris Yeltsin, the Westernizer, is but a transitional figure in an inevitable slide toward chaos, soon to be replaced by an authoritarian Slavophile regime that will reproduce all the more alarming features of Stalin, seeking confrontation with the West in order to restore some semblance of domestic order.[2]

While all scenarios are not that dire, they still cast doubt on the reliability of Russia and its space partnership. Maxim Tarasenko, a Moscow space program analyst, expressed his concerns that, "political instability in Russia inhibits its ability to sustain complicated space activities without interruption, especially long-term cooperative projects."[3] An article in *Issues in Science and Technology* talks about the Russian stability and its effect on our cooperative space program.

> The United States has grave concerns about Russia's treatment of Chechnya and its plans to sell nuclear equipment to Iran. Russia, for its part, has expressed worries about the expansion of NATO toward the east. Any one of these major political concerns, though not directly linked to cooperation in space, could nevertheless upset existing plans.[4]

Again, the political direction that Russia takes will determine not only the future stability of Russia, but also the future direction of the U.S.'s political relationship with Russia.

Based on the past history with Russia, any political "cooling" of relations could easily effect current space cooperative actions between the two countries.

The directions and the stability of Russia will be partially determined by the coming presidential elections. The recent elections returned many communists and ultra-nationals to power in parliament. Amongst the new officials is Russia's new foreign prime minister, Yevgeny Primakov. Primakov is noted as "one of the most unsavory anti-western officials in the Russian foreign policy community."[5] Known as a former KGB agent, he is notorious for his involvement with anti-American and terrorists activities. The Reserve Officer Associations March 1996 National Security Report detailed his past activities.

> While a *Pravda* "journalist" in the Middle East during the 1960's, he is reported to have doubled as a courier to deliver KGB money to various terrorist organizations to finance attacks against Israeli and American targets.... Within the Communist Party leadership under Leonid Brezhnev, Primakov was the main patron of Iraqi leader Saddam Hussein, and later a staunch patron of Libyan leader Moammar Khadhafi. He wrote the Soviet communist Party's ideology justification for the 1979 invasion of Afghanistan, and in 1990 and 1991, tried to save Saddam Hussein from attack in advance of *Desert Storm.* When Soviet Foreign Minister Eduard Shevardnadze sought to have Moscow join the *Desert Storm* coalition, Primakov, from his politburo perch, went through the back door to undermine the initiative and save Saddam with a phony 'peace' program. Today, Primakov is our Secretary of State's counterpart and the principal official for relations with the United States. But time has not mellowed him. The press reports that one of his first actions as foreign minister was to forgive $8 billion of Libya's debt to Russia, to pave the way for Kadhafi to buy more Russian weaponry.[6]

The decisions that the new foreign minister is taking must be taken in context of Russia's economic problems. Due to the large number of communists and ultra-nationalists just elected, Secretary of State Warren Christopher is starting to reassess his Russia policy.[7]

George Tahu, space policy analyst specializing in Russian space programs, also expressed concerns about the Russian stability, but stated he was not paranoid of the future elections. He feels the Russian people are supportive of the space program and will remain so no matter who controls of the government. He claims the Russian people are proud of their space program and want to keep their space program alive. The best way and maybe the only way they can do that is through partnership with the U.S.[8]

Russia's direction and stability are still uncertain. While, there are many possible routes that Russia could take, all indicators show that the Russians want to continue their space program. Maxim V. Tarasenko, Russian analyst, has studied the presidential candidates and their attitudes on the Russian space policy. He concluded that major parties and candidates considered the space program an essential attribute of a great power and a major employment factor. However, while the candidates and parties were supportive of the Russian space program, not all favored the international space station. Some felt that it was a "non-equal sell-out of unique national know how."[9] This he felt could be offset by the importance this project is to the Russian space infrastructure and that the industrial lobby could counter any opposition. Therefore, he concluded that even the most drastic overturn of power after the election would not deter Russia from continuing the cooperative space station program with the U.S.[10]

One could look at Russia's support of the space cooperative program with the U.S. from two viewpoints. One viewpoint would be that our mutual space cooperative program is important enough to the Russians that it would serve as a motivator to remain on good political terms with the U.S. On the other hand, the U.S. has used past space cooperative programs as a leverage and a foreign policy tool to coerce Russia's actions.

However, the stability and the future of Russia politics is directly linked and will effect the future success of the cooperative manned space program.

The Economic Situation in Russia

The second major challenge to the success of U.S.- Russia space partnership is the failing Russian economy. Russia's economy is in a severe recession that has gripped the country since 1991.[11] The budget problems have drastically effected the Russian space program and resulted in numerous cancellations and delays in space programs. "*Mir*'s cosmonauts have occasionally run low on spare parts and even food because launches of supply rockets have been delayed or canceled."[12] The fragility of the Russian economy presents a complete new set of worries about Russia being able to fulfill its commitments to the space station effort. Worries over the Russian economy have led NASA to depart from its usual practice of not exchanging funds in cooperative programs. NASA believes Russia will eventually make substantial contributions to the space station, financed with its own resources. However, to help ensure that capability to make those contributions survives Russia's current troubles, the United States will pay about $650 million over four years for Russian goods and services. This included $100 million each year for equipment and services supporting shuttle-*Mir* cooperative activities, such as crew training. It also includes at least $210 million for the Functional Cargo Block for the docking mechanism that allows the shuttle to connect with *Mir*, $16 million for two life science satellites, and about $10 million for other goods and services."[13] These expenditures are purchases of useful goods and services do not represent foreign aid to Russia.[14] These purchases should help preserve employment for Russian engineers and

technicians in at least some of Russia's major space industrial centers, thereby inhibiting proliferation through "brain drain" and helping to sustain Russian adherence to Missile Technology Control Regime. Moreover, NASA's purchases improve the chances that Russia will be able to meet its obligations to the space station project, thereby enhancing prospects for success.

This substantial space budget for Russia services may not be enough to keep the space partnership alive. Maxim V. Tarasenko analyzed how drastically the Soviet/Russian budget had declined from 1989 to 1995. He wrote, "According to the Russian Space Agency (RSA), funding for space programs fell in real terms more than five-fold, from the equivalent of US$3.9 billion to US$0.69 billion; relative to GNP it declined from 0.73% to 0.29%."[15] He goes on to compare this to NASA's cutbacks, " NASA, with its expected budget cuts of around 12% in the next five years looks like a pillar of steadiness and wealth from a Russian perspective."[16]

Space News reports a Russian space official as saying, "If I were our Western partners, I would tend to rely on my own resources until the Russian situation becomes more stable."[17] Other than the joint space international payments, there appears to be no relief for the struggling Russian economy. Vladimir Solovyov, director of the *Mir* control center in Kalingrad, said, "the biggest challenge for Russian engineers in the shuttle *Mir* program was obtaining the necessary financing from the Russian government."[18] Solovyov claimed U.S. government support to the Shuttle-*Mir* program is not enough to cover our expenses.[19] In 1992, the Russian manned space program was jeopardized when the workers threatened a strike. Management at the *Mir's* control center agreed to raise wages and benefits to prevent the work strike.[20] However, the real problem is that the

government does not always have the money to pay workers or contractors. Tarasenko reported that three dozen enterprises, subordinated to Russian Space Agency (RSA) had a cumulative debt of about 500 billion rubles in February 1995, while the Government itself owed them 470 billion rubles.[21]

Yet, in spite of the dire economic situation in Russia, some analysts still believe that the Russian space program will survive. George Tahu believes that the Russian space program has done well to survive despite the financial problems and agrees with the U.S. support of the Russian space budget. He summarized that if the U.S. had the economic pressure on the space program that the Russians have on their space program, our program would be gone.[22] This reinforces his concept that despite the current economic problems, the Russians will continue to find a way to keep the cooperative space program alive.

Russia's Proliferation of Weapons of Mass Destruction

The third challenge, proliferation of weapons of mass destruction is a direct result of the floundering Russian failing economy. The destructive weapons that may be sold to other countries includes nuclear weapons, chemical and biological weapons, conventional weapons, and the scientific knowledge to build these weapons. Senator Sam Nunn of Georgia, ranking Democrat on the Senate Armed Services Committee claims this is the number one security problem with the new Russia. He stated,

> Russia currently possesses at least 20,000 nuclear weapons—in fact more than 20,000—at least 40,000 tons of chemical weapons, advanced biological warfare capability, hundreds of tons of fissile material, huge stores of conventional weapons, plus thousands of scientists and technicians skilled in manufacturing weapons of mass destruction."[23]

The security risk with this large amount of excessive weapons is amplified by the unstable military regime and the economy. With the aerospace industry virtually bankrupt, the backbone of the industry's workers are unemployed and desperate for money. Maxim V. Tarasenko gathered the statistics from the RSA. "By the end of 1994 employment in the space sector had decreased to 64-66% of the 1989 level."[24] Even the employed workers have heavy financial problems, which are compounded by the high rate of inflation. The average monthly salary in the space industry in 1994 was about 192,000 rubles (equivalent to 80 U.S. dollars). By 1995 the average salary in the space industry had risen to 296,000 rubles, but with the decline of the ruble was equal to only 70 U.S. dollars.[25] George Tahu, international space analyst, said many of the aerospace engineers can get better job driving cars than they can get as highly skilled engineers.[26] Thus, many of the former aerospace employees have either started selling weapons or moved to countries that are seeking the Russian weapons and the Russian aerospace skills. There are many countries, including shaky third world countries, willing to pay the price for these weapons and these skills. John Pike expresses his concerns about this potential security risk.

> The growing glut of conventional and unconventional arms on the world market can only be read as an omen of widespread proliferation of advanced weapons systems, especially by this once and, hopefully, never future adverse. Deprived of Cold War rationale, some elements of the complex remain leading opponents of reform. Institutions and personnel of the former Soviet aerospace complex are now searching for new outlets for their energies, including sales of advanced combat aircraft to Third World countries and emigration to these countries to work on emerging missile programs."[27]

This combination of an international market and desire to obtain weapons of mass destruction increases Russia's opportunities to sell these weapons.

This accelerated proliferation of weapons to third world countries could threaten our national security. Therefore, Russian engineers and scientists employed by the U.S. directly decreases the number of engineers and scientists who might try to sell weapons, knowledge or skills to other countries. The U.S. contribution in terms of financial purchases and employment of the Russians is not only helping to keep the Russian manned space program alive, but it is also decreasing the proliferation of weapons and technology and therefore contributing to our national security. An article in Issues *in Science and Technology* agrees with this concept.

> Access to Russian expertise and technology could assist disruptive countries in accelerating their missile development programs. By helping to keep Russian scientists and engineers gainfully employed on cooperative projects the United States hopes to give them an incentive to remain in Russia. And by spending funds in Russia on aerospace hardware and services, the United States hopes to lessen the temptation for Russia to earn hard currency by exporting its technology to nations that do not abide by the Missile Technology Control Regime.[28]

Thus, by investing in cooperative projects with Russia, the U.S. is investing in its national security, as well as the Russian products and services. Furthermore, the U.S. is also helping stabilize the Russian economy by employing Russians.

The continued challenge of Russia's proliferation of weapons of mass destruction threatens the U.S.-Russian cooperative manned space programs as well as our national security. An example of this threat occurred in 1992 when the U.S. and Russia were trying to rocket engine technology to India. India was in the process of developing its own launchers for nuclear weapons. The U.S. determined that the sale would violate the terms of the Missile Technology Control Regime. Again, using the cooperative space program as a political tool, the U.S. threatened to block any future Russian launches that

contained U.S. technology if they proceeded with the sale. Russia chose to cancel the sale and continued to work out a cooperative program with the U.S.[29] This action showed that Russia is serious about working with the U.S. and the cooperation is a motive for Russia to control proliferation of weapons of mass destruction.

Space expert John Pike agrees that our cooperation and purchases for goods and services from Russia also contribute to our national security. He writes,

> But considered as a national security program, one which keeps Russian technologists busy and Russian militarists in compliance with missile proliferation agreements, the cost of piloted space flight seems quite modest - far less than the $275 billion spent each year by the Department of Defense.[30]

By looking at the U.S. investments from Pike's angle, it becomes obvious that the U.S. is getting triple "bang for the buck" for the monies it puts in the U.S.-Russia cooperative manned space program. By employing Russian scientists and technicians, it is purchasing unique space capabilities, services, and goods. Employment of the Russians contributes to the stabilization of their economy. Finally, employment of the specialized Russian space experts reduces their need for employment, and therefore reduces their need to sell their weapons and services to other countries. This reduction of proliferation increases the security for the U.S.

The Cultural Barriers

The fourth challenge to the U.S.-Russian space station cooperation and success is the distinctive cultural barriers. These cultural barriers range from different organizational and political systems and procedures between the two countries, to changes within the Russian system, and extends to individual practices and personalities. The Russian space

program began over fifty years ago under the Soviet Communist Regime. Diametrically opposite of the western system of business, the Soviet communist system was entrenched with habits of "bureaucratic secrecy" and the tendency to resist requests for information.[31] The decades of the two different management styles are evident as Russia attempts to adapt to the democratic western style of management. Russia is experiencing internal cultural changes as the Russian people must learn to give up their old familiar communistic ways and adjust to a democracy and competitive capitalism.

The years of the Communist influence are compounded by Russia's undeveloped the institutional (e.g. legal and economic) infrastructures to support the western style of business. Russia has undergone monumental changes in the last few years, changing from a centralized Soviet regime to an emerging democracy. These changes have resulted in new and "fragile" institutions.[32] The developing stages of the new system are evident throughout the space program. "Even basic information about research and production facilities—names, addresses, phone numbers—were not of the public record during the Soviet period. Russians officials are still in the early stages of such rudimentary marketing activities as compiling [a] space directory."[33]

The USSR and the U.S. space programs were originally set up differently in the 1950s and 1960s. The U.S. had kept its military program out of the public eye and created a separate civilian space program, the National Aeronautics and Space Administration (NASA). Each program had a separate budget. The USSR, on the other hand, had combined the military and civilian space programs and they operated with the same budget.34 To help alleviate these institutional differences, Boris Yeltsin, the new president of the Russian Federation, established the Russian Space Agency (RSA) in

1992. The RSA separated from the military to form a separate civilian space agency, much like NASA. RSA reports directly to the government of Russia. It is responsible for creating space policy and submitting the space policy to the government for ratification. RSA is responsible for space program management, budgeting and international negotiations. RSA is funded through several ministries, including the Ministry of Science. Unlike NASA, it is a small organization with about 200 people.35 It does not have the R&D activities or the people to perform program oversight. These activities must be contracted out to Russian contractors. Most of the Russian contractors were once part of the integrated military system and are also going through an adjustment, which sometimes induces resisting direction from the newly created RSA.[36] The adjustment to a new work and management style with the Russian contractor is compounded by the economic situation (previously discussed) where contractors are slow to be paid by the RSA.

Intertwined in the cultural barriers are the years of competition and mistrust between the two countries. Although there were some attempts, usually for political reasons, to cooperate in the space programs, the U.S. and the FSU have a history of over 30 years of enforced isolation of the two national space programs. Combining the past cultural animosities with the institutional differences is bound to create some problems. A *Space News* article quotes Vladimir A. Solovyov, director of the *Mir* mission control center.

> The barriers produced by the Cold War have disappeared but the different way of doing things have not gone away. To join these two different types of work habits into a single, coordinated program is very difficult. The realities of the shuttle-*Mir* program are more complicated than we had thought.[37]

However, the creation of the RSA to a similar structure to NASA has helped alleviate some of the original infrastructure barriers and made the combined programs more workable.

Despite the difficulties, the joint interests of the astronauts and cosmonauts appear to have overcome the past hostilities and cultural differences. The shuttle-*Mir* missions are the "test-beds" to work out the cultural differences before the building and manning of the international space station. *Time* elaborated how astronaut, Dr. Norman Thagard, resolved the cultural barriers on his excursion to *Mir* for the first U.S.-Russian three month habitation of the Russian space station.

> Instead of preparing for the launch on the balmy shores of Cape Canaveral, the Florida native faces the 18 degree chill of the Baikonur Cosmodrome in Kazakhstan. He spoke the language not of Neil Armstrong, but of Yurri Gagarin. And when he tried to follow the American astronauts' ritual of eating a piece of cake before launch, the Russian flight doctors said *nyet.* Instead, Thagard and his fellow crew members, cosmonauts Vladimir Dezhurov and Gennady Strekalov, carried out a Russian tradition: they urinated on the tires of the bus that brought them to the launch pad.[38]

After Thagard spent more than three months on *Mir* with the Russian cosmonauts, he underwent numerous interviews and debriefs to determine the effect it had on him both professionally and psychological. Thagard did admit that he went through "extreme cultural isolation" during the time on the Russian space station.[39] The cosmonauts were also interviewed and debriefed on the cultural differences. They admitted that there was occasional friction, but nothing severe. When asked about Thagard's interviews, the cosmonauts concluded that he was whining.[40] Despite these minor cultural disparities, the first joint *Mir* mission was declared a success and deemed "tangible evidence of the

beginning of a cooperative effort that was successful in creating a permanent presence for Earthlings beyond the planet."[41]

The first joint mission served as a great learning experience to identify future cultural differences that can be corrected prior to future missions. Suggestions were as simple as to include U.S. videotapes on future missions so astronauts can hear their native language and prevent cultural deprivation.

At the same time Thagard was in space the Technology Assessment Board of the 103 U.S. Congress also identified the need to manage cultural differences throughout the space program in their Findings. In their report, *U.S.-Russian Cooperation in Space*, they discussed this specific challenge. They presented these recommendations to U.S. entities to reduce these risks. One of these recommendations included, "Be aware of and manage cultural differences."[42] To do this, they suggested:

- Sensitize all personnel who will be in contact with Russian personnel to be aware of cultural differences, learn ways to avoid affront and build personal rapport with their Russian counterparts.
- Resist the temptation to assume that the U.S. and Russian personnel share common assumptions about the meanings of business or contractual terms and concepts; when in doubt, such terms should be spelled out. Find out who has the authority to make the needed decisions.
- Avoid postures or assumptions of superiority, particularly in technical areas; a good rapport and mutual respect for each other's technical achievements and capabilities are critically important.
- Make us of the best available expertise in Russian non-aerospace business law and practices, both to structure relationships properly and to avoid surprises as much as possible when political or financial circumstances change.[43]

The rationale behind the recommendations is that awareness and sensitivity to the cultural differences will increase understanding and prevent conflicts.

The U.S. is already learning from the past experiences with the Russians. Within the last days, the U.S. conducted their third docking with the Russian Space Station, *Mir*.

NASA Astronaut Shannon Lucid will stay on the Russian Space Station for a record five months. Like Thagard, she was greeted with warmth and laughter from the two Russian cosmonauts already on *Mir*. Unlike, Thagard, she had the advantage to learn from his previous long term stay on the space station. Thagard had limited food selection and sparse family contact. Learning from his lessons, Lucid got to choose her meals in advance and has been promised regular calls home.[44] Thus, Lucia's preparation for the record stay on Mir is an indicator that as the Americans and the Russians continue to work together, they will learn to understand each other and their unique situations and alleviate these cultural barriers.

The Reliability of the U.S. as a Partner

Another challenge to the cooperative space program is the U.S.'s reliability as a partner to Russia. The U.S. space program's budget is controlled by Congress and allocated annually. Even though the U.S. has budgeted monies for the completion of the space station, the Congress always maintains the power to reallocate the budget.[45] Space expert, John Logsdon expresses this concern.

> In the United States, a persistent budget deficit limits growth in many government programs, space included. Indeed, it is only with great difficulty—requiring direct White House involvement—that the NASA budget and the largest NASA program, the space station, have so far survived deficit-reduction attempts."[46]

Even though there is current funding for the international space station, there is no guarantee that any political situation with Russia could cause the Congress to curtail the funding for the space station and end the U.S.'s current cooperative effort with Russia.

The fragility of the space funding is accentuated by some Congressional distrust for Russia and its being in the "critical path" for completion of the space station. Rep. James Sensenbrenner (R-Wis.), chairman of the House Space and Aeronautics Sub-committee raised the concern for Russia as a space partner and questions "whether the space station deal with Russia can be justified on its scientific and technology merits, rather than amounting to little more than foreign aid or the export of U.S. jobs to Russia."[47] He also described the hearing's examination of space station plans involving Russia "somewhat surreal, like measuring the size of the tea cups at the Mad Hatter's tea party."[48] Rep. Steve Stockman, (R-Tex), shares Rep. Sensenbrenner's concerns. He claims, "The tragedy in Chechnya should serve to remind U.S. all that a terrible unexpected turn of events can still happen very swiftly even in a democratically minded, reforming Russia."[49]

Another Congressional concern that could effect the funding of the space station is the actual benefit that can be derived from this huge investment. Congressman Dale Bumper (D-Ark) has voted against funding the space station for the last four years. He argues that Russia has had their space station for more than eight years and has derived no benefits from the enormous amount of monies they have spent on the station.[50] John Pike, Space Policy Director of the Federation of American Scientists agrees that other than political implications, there is simply no justification on scientific or technical grounds that the space station cost of billions of dollars can be justified.[51] He claims that "the best redesign [of the space station] would be to cancel it altogether."[52] He is among many of the leaders in the space field who question NASA's continued fight for the space station. Former NASA historian Alex Roland, Professor at Duke University also is

concerned about the return we get from the billions of dollars the international space station will cost. In an interview aired in January 1996 on Arts and Entertainment Network Television documentary, "Can We Still Trust NASA?" he stated, "Man's space flight is far more expensive, far more difficult and far more dangerous and far less productive than we imagined in those wonderful days of Apollo."[53] The narrator of this documentary also claimed that NASA's future is directly linked to the space station. Thus, NASA's interest in the space station may be survival rather than payoff or benefit for the U.S. and Russia.[54]

Added to the mistrust of Russia by the Congress is the mistrust of NASA by Congress. The Arts and Entertainment documentary, "Can We Still Trust NASA?" explored the political and bureaucratic nature of NASA. Based on the past overruns and scandals, the documentary claimed that NASA has angered both the public and Congress.[55] Alex Roland claimed that former NASA workers had stated that NASA "flat out lied to Congress."[56] That NASA is after is own self-interests is questioned by other space experts. John Pike claims that NASA's main concern is how to divvy up the tax payers money for their private benefit.[57] This distrust of NASA by some Congressional and space experts also jeopardizes the future of U.S. and Russian cooperative efforts. Now Congress not only mistrusts or is skeptical of the Russian future and political situation, but they also are skeptical of the rationale and information that NASA presents to them.

Beside a shaky American budget for the space station program, the U.S. does not have a good reputation for honoring its agreements with its space partners. In 1979, the U.S. Congress budgeted to participate in a joint NASA-European Space Agency (ESA)

spacecraft mission to study the polar regions of the sun. The project, nicknamed Solar Polar, was confirmed by NASA in a Memorandum of Understanding (MOU) with ESA. Despite these actions cementing Solar Polar, the project was cut from the 1981 budget without prior consultation with ESA.[58] ESA was only notified of this decision hours before the budget cuts were announced thus resulting in ESA wasting millions of dollars.[59] The trend toward the U.S. acting unilaterally while under a partnership agreement again was violated in 1993 when the U.S. announced the agreement to include Russia in building and operating the International Space Station. "This announcement was made with little prior consultation between the United States and its existing space station partners."[60] This unilateral action in a multi-national agreement caused great concern among the other nations. Since that time, NASA has attempted to repair the damage they made to their image have done by acting unilaterally instead of as a partner. They have worked to show more mutual respect for the other partners and to work cooperatively as a team.[61]

Both the U.S. and Russia have run their own space programs over the last decades, and therefore both must readjust to working hand-in-hand without one assuming a superior or arrogant role over the other. Violations of this could result in increased tensions and jeopardize cooperative space station programs. This concern, along with some the Congressional concerns about the Russian stability and future, as well as NASA's capability and integrity, add the to challenges for a successful U.S. and Russian space station program.

Operational Challenges

The final challenge to the U.S.-Russian success in the international space station program is operational concerns. Operational concerns include the political and programmatic challenges. Both issues are interwoven and involve the actions necessary for NASA and the RSA to operate the *Mir*-shuttle programs and to design, produce, and man the new international space station.

Bureaucratic "red tape" and political pressures are prominent throughout the U.S. governmental system. One of the bureaucratic barriers is the current customs system. In preparation for Thagard's flight vigil on *Mir*, the U.S. tried to ship scientific equipment that he needed for the mission to Russia. However, the U.S. export controls and the Russian customs clearance process prohibited the transfer of the equipment. Only with the cooperative intervention of U.S. Vice President Al Gore and Russian Prime Minister Viktor Chernomyrdin was the problem resolved. To prevent this problem in the future, NASA negotiated with the Departments of State, Defense, and Commerce for a blanket data-export authorization on equipment needed for the space station project. Equipment or supplies needed for other cooperative efforts will be handled on case-by-case basis by the authorities.[62]

Another operational concern is the launch facility that will be used for future manned space flights. A large part of Russia's contribution to the international space station program is their launch capability. However, Russia's launch facility is not in Russia, but in the neighboring country of Kazahkstan. Russia and Kazahkstan signed a treaty in 1994 that leases Russia the use and control of the Baikonur Cosmodrome until 2014. The treaty includes the possibility of a 10-year extension.[63] This lease agreement provides

added incentive for the U.S. to help insure good relations between Russia and Kazahkstan. NASA opened its own lines of communication with the Baikonur space authorities in order to keep directly abreast of space developments. This lease agreement on the Baikonur Cosmodrome increases the U.S. reliance on Russia as a partner for future manned flights and the success of the international space station.

Along with the U.S.'s concerns on the launch facilities, are also concerns with the prices for launch services. When the Soviet prices for launch services were released 1989, they were two to three times lower than in the West. However, since then, the economical situation and inflation has caused the Russian prices to soar, and has caused the originally low prices now to match or exceed the prices in the West.[64] Linked to the operational challenges are the economic challenges. Increased inflation in Russia could cause operational costs to exceed the congressional budget and jeopardize the international space station.

The actual design, building and operation of the joint manned space station programs are both political and technical challenges for the U.S. and Russia. With the blueprints due in May 1996, the two countries still have not agreed on operational and control issues. NASA and Russia's mission control center in Kalingrad will divide the control of the *Mir*-shuttle missions and the international space station missions. To date, it has not been decided who will control what and when. Issues so basic as to the makeup of the initial crews has not been determined. Russian negotiators are demanding the right to control three of the station's six full-time crew and virtual autonomy for operations involving Russian-manufactured elements. The U.S. is insisting on at least one American for the initial Russian-launched crew.[65] While these command and control issues are

politically volatile, they are not impossible to overcome. One of the solutions is to look at the nature of the mission that is being accomplished and let the country conducting the mission control the maneuvers. Vladimir Solovyov, director of the *Mir* control center stated,

> The problem of who controls the maneuvers is a complicated one. Once the shuttle is docked, the main control should be with whichever side is effectuating a dynamic process. The other will then help out in a secondary role.[66]

The operational issues will probably be a valid challenge throughout the life of the international space station, however, as the missions and roles become more defined, the command and control issues may become more clear.

The latest operational challenge to the success of the U.S.- Russian international space station program involved the recent RSA proposal to build the new space station around Russia's *Mir* station. *Mir* was scheduled to shut down when the assembly of the international station began in November 1997. However, *Mir* appears to have a longer life span than expected and the Russian officials do not want to abandon the existing space station while it is still functional. Representative James Sensenbrenner, the Republican from Wisconsin who reluctantly voted to budget the international space station because of Russia's participation, headed a delegation to Russia to negotiate the issue. After conferring with NASA leaders and the U.S. Vice President, Rep. Sensenbrenner presented a compromise that would extend the life of *Mir*, but keep it separate from the new international space station. He also informed the Russians that they are jeopardizing future congressional support for the joint project. Rep. Sensenbrenner had already warned the Russians earlier this year that the U.S. and the

other partners could and would complete that station without them if necessary.[67] An agreement was reached in January that would extend the life of *Mir,* but keep it separate from the international space station. This would include the U.S. space shuttle delivering more supplies to *Mir.* While the terms of the agreement have been made, the finances are still to be negotiated. William Tafton, space station chief, left the door open for additional U.S. cash payments to Russia but emphasized that NASA cannot break the $2.1 billion spending cap agreed to by Congress and the White House.[68] Tafton reminded the Russians that the U.S. had a contingency plan to finish the international space station without their support. He warned, "Stop proposing major changes to the program or the United States could be forced to complete the station without Russia."[69] Marcia Smith, an analyst with the congressional Research Service in Washington questioned some of the actions NASA is taking with Russia. With Congress already suspicious of Russia and NASA, Smith expressed concern for the distance that NASA is going to keep Russia in the partnership.[70]

As Solovyov stated, the issues are complicated. The design, building and manning of the international space station are complex, both technically and politically. However, as in any project this dynamic, challenges and complications are to be expected. This is one area where the U.S. and Russia countries have the potential to benefit from the compilation of the divergent and unique capabilities both countries have to offer. The combination of both countries' experiences and expertise, with a teamwork approach, can help overcome these challenges.

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Chapter 5

Incentives to Overcome the Challenges

While these many and linked challenges face the success of the U.S. space partnership, there are many who believe the potential results are worth the risks. NASA Administrator Dan Goldin is one who believes that the U.S.-Russian partnership in the space station program will have tremendous payoff. He stated, "our cooperation with the Russians in space is based in hard headed realities. We believe Russian capabilities will have a tremendous payoff for the U.S."[1] The main payoff is that it may save both the U.S. and the Russian space programs, as well as the space station. Russia is in economic chaos and the U.S. is having huge cutbacks in its space programs. The combined skills, product, services and monies could save both programs. Maxim Tarasenkon, Russian space analyst argues that the U.S. and Russian cooperation is essential to preserve both space programs. He states,

> International space cooperation is viewed by the Russian Space Agency (RSA) and industry as a way of continuing prospective projects which cannot be sustained by the country alone. Uniting the efforts of various countries (especially Russia and the USA.) could safeguard scientific and research capabilities developed during the Cold War that are threatened with disappearance thanks to a drop in demand.[2]

Likewise, "without Russian involvement, the U.S. and its partners might not have a space station at all. An article in *New Scientist* confirms that the cooperative effort will save the international space station. "The rewards of collaboration could be great - no

single country can muster the finance to take on a project like Alpha (the original name of the space station) alone, and success would score valuable political points."[3] All partners in the international space station are facing considerable pressure on their space budgets, and the U.S. does not appear willing to commit the huge resources required to build a space station on its own.[4] This appears to be a controversial question, since NASA and Congress has consistently informed Russia they had a contingency plan to complete the international space station without Russia's help.[5]

Another payoff for combined space programs that the combined expertise will result in a better international space station. NASA Administrator, Dan Goldin claims that purchases of Russian technology has resulted in reduced American research and development costs, thereby saving taxpayer dollars.[6] The technological advances already can be seen in improvements in the design of the international space station. *Issues in Science and Technology* report

> The technological benefits of Russian involvement in the space station are substantial. The station would have 25 percent greater volume, more power, and would be completed 15 months earlier. Further, the space station is the largest, most expensive, most visible, and most politically important cooperative science and technology project in which the United States has ever been involved. Making it a success is key to U.S. credibility as the global leader in space activities, and Russian involvement make success all the more certain.[7]

However, there are some that would argue that any technical advantage we gain by purchasing Russian expertise and technology is offset by the jobs in the U.S. that are now being given to the Russians. This is a controversial issue that was addressed the Congressional Report on the U.S. cooperative space program with Russia. The report concluded that experts disagreed on the effect this would have on the U.S. aerospace

employment and technological base. Some argued that the use of Russian technology into U.S. projects would save taxpayers money while others argued that employment of Russian technology would eventually hurt the U.S. space program.[8]

As already discussed, the cooperative space program helps resolve the first three challenges to the U.S.-Russia success: Russia's instability, the Russian economy, and proliferation of weapons of mass destruction. By purchasing Russian technology, service, and products, the U.S. is employing Russians and putting money back into their space program and their economy. This will increase employment in Russia and help the Russia economy. The increased revenue to the economy will in turn help stabilize Russia. Also, by employing professional aerospace personnel, the U.S. decreases their need to look elsewhere for income and decreases the odds of additional proliferation of weapons and technologies. Logsdon and Williamson summarize the combined rewards of space cooperation with Russia.

> From the U.S. standpoint, cooperation with Russia in space helps promote Russian economy and political stability while enabling the United States to benefit from Russian space expertise and technology. The United States is also strongly interested in preventing the proliferation of missile and military technologies, and of experts in those technologies to other countries.[9]

Therefore, one of the more realistic benefits is the direct economic effect of employing Russian technical expertise. However, this is more a political maneuver with potential political rewards than a true desire for manned space exploration.

Finally, the U.S.-Russia joint space ventures can set a precedent for the world. These ventures can be the example of cooperation versus competition. The U.S. and Russian political leaders can look the space program as the architecture for mutual benefit over

mutual destruction. They can use the space programs and the cooperative attitudes of the scientists, astronauts and cosmonauts as model for the world to emulate. The political significance on how two previous rivals can work together in a win-win situation that synergizes the prestige of both countries while making technological and scientific improvements is enormous. John Logsdon claims, "Introducing Russia as a partner in the program recognizes the post-Cold War context of current space activities and provides highly salient political symbolism, as all major spacefaring countries work together to open up Earth orbit for human activity."[10] Therefore, any political gain made by the U.S. and Russia through their mutual space station program could lead the way for other countries to try a cooperative versus antagonistic approach with past enemies.

Dr. Ernst W. Messerschmid, Director, System Institute, Stuttgart University agrees that cooperation in space will contribute more than national prestige and political rhetoric. He looks at space cooperation from a universal application for what it might eventually contribute scientifically and technologically to our planet.

> In addition, human space exploration will do much more to improve life on Earth. We space explorers have learned from our past flights that the Earth is a fragile and endangered planet. One of our highest priorities is to educated the public on the dangers and to take actions that protect the home planet for future generations. This is our mission to planet Earth. . . . International human space exploration is a fundamental part of a vision of the future in which both people and nations can learn to live in harmony with each other and with technology; using technology to protect the home planet, to improve the quality of life for everyone on Earth, and to make other planets livable for humans. This is a twentieth century vision that will drive the scientific discoveries and technological developments in the twenty-first century.[11]

Dr. Messerschmid's universal approach to space exploration appears lofty, yet not impossible. If the U.S. and Russia can stay focused on the positive and universal

benefits, they can become the role model international and universal cooperation. Although analysts like John Pike argue that there is no scientific and technological justification for the cost of the international space station, no one can be sure and predict that scientific and technological breakthroughs might be made in space that have universal significance to our universe.

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Chapter 6

Conclusion

The new era of a cooperative manned space program with Russia and the U.S. is one with many challenges. Most of these challenges have to do with the current unstable and uncertain evolution of the Russian democracy. All the challenges are interwoven so that any affect on one of them will probably affect all of them. The challenges are also linked to money, both the Russian economy and the U.S. Congressional approval for NASA's budget. Even if all the current challenges that face the U.S. and Russia are overcome, the cooperative space station remains a political tool and may be used as a leverage by either country.

Unlike previous attempts at a U.S.-Russia space mutual space program, the current cooperative efforts are being made without the political arena of the Cold War. This is a new era and one where both countries need to look toward the future rather than dwelling on the past. Successful cooperation in the manned space flights and the international space station could benefit both countries tremendously and help create a new and more stable world order. The political implication of past enemies joining resources to work together and help benefit mankind is unlimited and could significantly promote world peace.

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