National Security

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To fully understand the story of the development of the Space Shuttle, it is important to consider the national defense context in which it was conceived, developed, and initially deployed.

The Cold War between the United States and the Union of Soviet Socialist Republics (USSR), which had played such a large role in the initiation of the Apollo Program, was also an important factor in the decisions that formed and guided the Space Shuttle Program. The United States feared that losing the Cold War (1947-1991) to the USSR could result in Soviet mastery over the globe. Since there were few direct conflicts between the United States and the USSR, success in space was an indicator of which country was ahead—which side was winning. Having lost the tactical battles of first satellite and first human in orbit, the United States had recovered and spectacularly won the race to the moon. To counter the successful US man-on-the-moon effort, the USSR developed an impressive space station program. By the early 1980s, the USSR had launched a series of space stations into Earth orbit. The Soviets were in space to stay, and the United States could not be viewed as having abdicated leadership in space after the Apollo Program.

The need to clearly demonstrate the continued US leadership in space was an important factor in the formation of the Space Shuttle Program. While several other programs were considered, NASA ultimately directed their planning efforts to focus on a reusable, crewed booster that would provide frequent, low-cost access to low-Earth orbit. This booster would launch all US spacecraft, so there would have to be direct interaction between the open, civilian NASA culture and the Defense-related National Security Space (NSS) programs. Use of the civilian NASA Space Shuttle Program by the NSS programs was controversial, with divergent goals, and many thought it was a relationship made for political reasons only—not in the interest of national security. The relationship between these two very different cultures was often turbulent and each side had to change to accommodate the other. Yet it was ultimately successful, as seen in the flawless missions that followed.

National Security Space Programs

The Department of Defense uses space systems in support of air, land, and sea forces to deter and defend against hostile actions directed at the interests of the United States. The Intelligence community uses space systems to collect intelligence. These programs, as a group, are referred to as National Security Space (NSS). Despite having a single name, the NSS did not have a unified management structure with authority over all programs.

Since the beginning of the space era, these defense-related space missions had been giving the president, as well as defense and intelligence leadership in the United States, critical insights into the actions and intents of adversaries. In 1967, President Lyndon Johnson said, "I wouldn't want to be quoted on this—we've spent $35 or $40 billion on the space program. And if nothing else had come out of it except the knowledge that we gained from space photography, it would be worth 10 times what the whole program has cost. Because tonight we know how many missiles the enemy has and, it turned out, our guesses were way off. We were doing things we didn't need to do. We were building things we didn't need to build. We were harboring fears we didn't need to harbor." Due to these important contributions and others, the NSS programs had a significant amount of political support and funding. As a result, both the NSS program leadership and the NASA program leadership often held conflicting views of which program was more important and, therefore, whose position on a given issue ought to prevail.

These two characteristics of the NSS programs—lack of unified NSS program management and a competing view of priorities—would cause friction between NASA and the NSS programs management throughout the duration of the relationship.

1970-1981: Role of National Security Space Programs in Development of the Shuttle

The National Security Space (NSS) is often portrayed as having forced design requirements on NASA to gain NSS commitment to the Space Shuttle Program. In reality, NASA was interested in building the most capable (and largest) shuttle that Congress and the administration would approve. It is true that NSS leaders argued for a large payload bay and a delta wing to provide a 1,600-km (1,000-mile) cross range for landing. NASA, however, also wanted a large payload bay for space station modules as well as for spacecraft and high-energy stage combinations. NASA designers required the shuttle to be able to land at an abort site, one orbit after launch from the West Coast, which would also require a delta wing. Indeed, NASA cited the delta wing as an essential NASA requirement, even for launches from the East Coast. NASA was offered the chance to build a smaller shuttle when, in January 1972, President Richard Nixon approved the Space Transportation System (STS) for development. The NASA leadership decided to stick with the larger, delta wing design.

National Space Policy: The Shuttle as Sole Access to Space

The Space Shuttle Program was approved with the widely understood but unstated policy that when it became operational it would be used to launch all NSS payloads. The production of all other expendable launch vehicles, like the reliable Titan, would be abandoned. In 1981, shortly after the launch of STS-1, the National Space Transportation Policy signed by President Ronald Reagan formalized this position: "The STS will be the primary space launch system for both United States military and civil government missions. The transition to the shuttle should occur as expeditiously as practical. . . . Launch priority will be provided to national security missions, and such missions may use the shuttle as dedicated mission vehicles."

This mandated dependence on the shuttle worried NSS leaders, with some saying the plan was "seriously deficient, both operationally and economically." In January 1984, Secretary of Defense Caspar Weinberger directed the purchase of additional expendable boosters because "total reliance upon the STS for sole access to space in view of the technical and operational uncertainties, represents an unacceptable national security risk." This action, taken 2 years before the Challenger accident, ensured that expendable launch vehicles would be available for use by the NSS programs in the event of a shuttle accident. Furthermore, by 1982 the full costs of shuttle missions were becoming clearer and the actual per-flight cost of a shuttle mission had risen to over $280 million, with a Titan launch looking cheap in comparison at less than $180 million. With the skyrocketing costs of a shuttle launch, the existence of an expendable launch vehicles option for the NSS programs made the transition from the shuttle inevitable.

Military "Man in Space"

To this day, the US Air Force (USAF) uses flight crews for most of their airborne missions. Yet, there was much discussion within the service about the value of having a military human in space program. Through the 1960s, development of early reconnaissance satellites like Corona demonstrated that long-life electronics and complex systems on the spacecraft and on the ground could be relied on to accomplish the crucial task of reconnaissance. These systems used inexpensive systems on orbit and relatively small expendable launch vehicles, and they proved that human presence in space was not necessary for these missions.

During the early 1960s, NSS had two military man in space programs: first the "Dyna Soar" space plane, and then the Manned Orbiting Laboratory program. Both were cancelled, largely due to skepticism on the part of the Department of Defense (DoD) or NSS leadership that the programs' contributions were worth the expense as well as the unwanted attention that the presence of astronauts would bring to these highly classified missions.

Although 14 military astronauts were chosen for the Manned Orbiting Laboratory program, the sudden cancellation of this vast program in 1969 left them, as well as the nearly completed launch facility at Vandenberg Air Force Base, California, without a mission. With NASA's existing programs ramping down, NASA was reluctant to take the military astronauts into its Astronaut Corps. Eventually, only the seven youngest military astronauts transferred to NASA. The others returned to their military careers. These military astronauts did not fly until the 1980s, with the first being Robert Crippen as pilot on STS-1. The Manned Orbiting Laboratory pad at Vandenberg Air Force Base would lie dormant until the early 1980s when modifications were begun for use with the shuttle.

The Space Shuttle Program plans included a payload specialist selected for a particular mission by the payload sponsor or customer. Many NSS leadership were not enthusiastic about the concept; however, in 1979, a selection board made up of NSS leadership and a NASA representative chose the first cadre of 13 military officers from the USAF and US Navy. These officers were called manned spaceflight engineers. There was considerable friction with the NASA astronaut office over the military payload specialist program. Many of the ex-Manned Orbiting Laboratory astronauts who had been working at NASA and waiting for over a decade to fly in space were not enthusiastic about the NSS plans to fly their own officers as payload specialists. In the long run, NASA astronauts had little to be concerned about. When asked his opinion of the role of military payload specialists in upcoming shuttle missions, General Lew Allen, then chief of staff of the USAF, related a story about when he played a major role in the cancellation of the Manned Orbiting Laboratory Military Man in Space program. In 1984, another NSS senior wrote: "The major driver in the higher STS costs is the cost of carrying man on a mission which does not need man. . . . It is clear that man is not needed on the transport mission. . . ." The NSS senior leadership was still very skeptical about the need for a military man in space. Ultimately, only two NSS manned spaceflight engineers flew on shuttle missions.

Launch System Integration: Preparing for Launch

The new partnership between NASA and the NSS programs was very complex. Launching the national security payloads on the shuttle required the cooperation of two large, proud organizations, each of which viewed their mission as being of the highest national priority. This belief in their own primacy was a part of each organization's culture. From the very beginning, it was obvious that considerable effort would be required by both organizations to forge a true partnership. At the beginning of the Space Shuttle Program, NASA focused on the shuttle, while NSS program leaders naturally focused on the spacecraft's mission. As the partnership developed, NASA had to become more payload focused. Much of the friction was over who was in charge. The NSS programs were used to having control of the launch of their spacecraft. NASA kept firm control of the shuttle missions and struggled with the requests for unique support from each of the many programs using the shuttle.

Launch system integration—the process of launching a spacecraft on the shuttle—was a complex activity that had to be navigated successfully. For an existing spacecraft design, transitioning to fly on the shuttle required a detailed engineering and safety assessment. Typically, some redesign was required to make the spacecraft meet the shuttle's operational and safety requirements, such as making dangerous propellant and explosive systems safe for a crewed vehicle. This effort actually offered an opportunity for growth due to the shuttle payload bay size and the lift capacity from the Kennedy Space Center (KSC) launch site. Typically flying alone on dedicated missions, the NSS spacecraft had all the shuttle capacity to grow into. Since design changes were usually required for structural or safety reasons, most NSS program managers could not resist taking at least some advantage of the available mass or volume. So many NSS spacecraft developed during the shuttle era were much larger than their predecessors had been in the late 1960s.

Space Shuttle Enterprise on Space Launch Complex 6 during pad checkout tests at Vandenberg Air Force Base in 1985. Enterprise was the Orbiter built for the Approach and Landing Tests to prove flightworthiness. It never became part of the shuttle fleet.

National Security Space Contributions to the Space Shuttle Program

The NSS programs agreed to provide some of the key capabilities that the Space Shuttle Program would need to achieve all of its goals. As the executive agent for DoD space, the USAF funded and managed these programs.

One of these programs, eventually known as the Inertial Upper Stage, focused on an upper stage that would take a spacecraft from the shuttle in low-Earth orbit to its final mission orbit or onto an escape trajectory for an interplanetary mission. Another was a West Coast launch site for the shuttle, Vandenberg Air Force Base, California. Launching from this site would allow the shuttle to reach high inclination orbits over the Earth's poles. Although almost complete, it was closed after the Challenger accident in 1986 and much of the equipment was disassembled and shipped to KSC to improve or expand its facilities. Another program was a USAF shuttle flight operation center in Colorado. This was intended to be the mission control center for NSS shuttle flights, easing the workload on the control center in Houston, Texas, for these classified missions. USAF built the facility and their personnel trained at Johnson Space Center; however, when the decision was made to remove NSS missions from the shuttle manifest after the Challenger accident, the facility was not needed for shuttle flights and eventually it was used for other purposes.

Flying National Security Space Payloads on the Shuttle

The NSS program leadership matured during a period when spacecraft and their ground systems were fairly simple and orbital operations were not very complex. In the early 1980s, one senior NSS program director was often heard to say, “All operations needs is a roll of quarters and a phone booth.” This was hyperbole, but the point was clear: planning and preparing for orbital operations was not a priority. It wasn’t unheard of for an NSS program with budget, schedule, or political pressures to launch a new spacecraft before all the details for how to operate the spacecraft on orbit had been completely worked out.

Early on, NASA flight operations personnel were stunned to see that the ground systems involved in operating the most critical NSS spacecraft were at least a decade behind equivalent NASA systems. Some even voiced concern that, because the NSS systems were so antiquated, they weren’t sure the NSS spacecraft could be operated safely with the shuttle. In NASA, flight operations was a major organizational focus and had been since the days of Project Mercury. NASA flight operations leaders such as John O’Neil, Jay Honeycutt, Cliff Charlesworth, and Gene Kranz had an important voice in how the Space Shuttle Program allocated its resources and in its development plans. Line managers in NASA, including Jay Greene, Ed Fendell, and Hal Beck, worked closely with the NSS flight operations people to merge NSS spacecraft and shuttle operations into one seamless activity. Many of the NASA personnel, especially flight directors, had no counterpart on the NSS government team.

To prepare for a mission, NASA flight operations employed a very thorough process that focused on ensuring that flight controllers were ready for anything the mission might throw at them. This included practice sessions in the control centers using spacecraft simulators that were better than anything the NSS personnel had seen. NSS flight operations personnel thought they had died and gone to heaven. Here, finally, was an organization that took “ops” seriously and committed the resources to do it right. As the partnership developed, NASA forced, cajoled, and convinced the NSS programs to adopt a more thorough approach to the shuttle integration and operations readiness processes. Over time, NASA’s approach caught on within the NSS. It was simply a best practice worth emulating.

Another component of NASA human spaceflight—the role of the astronaut—was initially very foreign to NSS personnel. Astronauts tended to place a very personal stamp on the plans for “their” mission, which came as a shock to NSS program personnel. Some NSS personnel chafed at the effort required to satisfy the crew member working with their payload. On early missions, the commander or other senior crew members would not start working with the payload until the last 6 months or so prior to launch and would want to make changes in the plans. This caused some friction. The NSS people did not want to deal with last-minute changes so close to launch. After a few missions, as the relationship developed, adjustments were made by both sides to ease this “last-minute effect.”

1982-1992: National Security Space and NASA Complete 11 Missions

The first National Security Space (NSS) payload was launched on Space Transportation System (STS)-4 in June 1982. This attached payload (one that never left the payload bay), called “82-1,” carried the US Air Force (USAF) Space Test Program Cryogenic Infrared Radiance Instrumentation for Shuttle (CIRRIS) telescope and several other small experiments. This mission was originally scheduled for the 18th shuttle flight; but, as the Space Shuttle Program slipped, NSS program management was able to maintain its schedule and was ready for integration into the shuttle early in 1982. Since the first two shuttle missions had gone so well, NASA decided to allow the 82-1 payload to fly on this flight test mission despite the conflicts this decision would cause with the mission’s test goals. This rather selfless act on the part of NASA was characteristic of the positive relationship between NASA and the NSS programs once the shuttle began to fly. For the NSS programs, a major purpose of this mission was to be a pathfinder for subsequent NSS missions. This payload was controlled from the Sunnyvale USAF station in California. This was also the only NSS mission where the NSS flight controllers talked directly to the shuttle crew.

Operational Missions

The next NSS mission, STS-51C, occurred January 1985, 2½ years after STS-4. STS-51C was a classified NSS mission that included the successful use of the Inertial Upper Stage. The

Inertial Upper Stage had experienced a failure during the launch of the first NASA Tracking and Data Relay Satellite mission on STS-6 in 1983. The subsequent failure investigation and redesign had resulted in a long delay in Inertial Upper Stage missions. With the problem solved, the shuttle launched into a 28.5-degree orbit with an altitude of about 407 km (220 nautical miles). The first manned spaceflight engineer, Gary Payton, flew as a payload specialist on this 3-day mission. This was also the first use of the "Department of Defense (DoD) Control Mode"—a specially configured Mission Operations Control Room at Johnson Space Center that was designed and equipped with all the systems required to protect the classified nature of these missions.

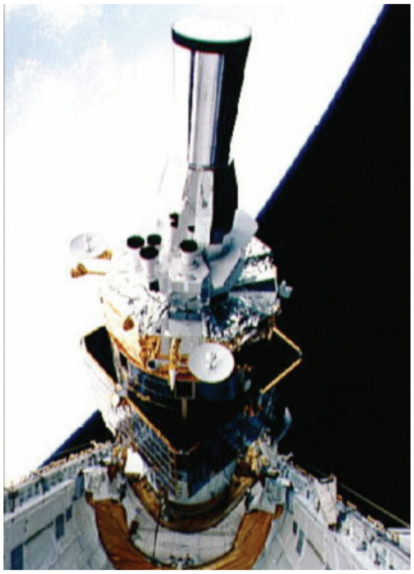
Gary Payton, US Air Force (USAF) Lieutenant General (retired), flew on STS-51C (1985) as a payload specialist. He was part of the USAF manned spaceflight engineering program and served as USAF Deputy Under Secretary for Special Programs.

The second and final manned spaceflight engineer, William Pailes, flew on the 4-day flight of STS-51J in October 1985. This shuttle mission deployed a defense communications satellite riding on an Inertial Upper Stage, which took the satellite up to geosynchronous orbit.

The Challenger and her crew were lost in a tragic accident the following January. After launching only three spacecraft payloads on the first 25 missions, the NSS response to the Challenger accident was to move all spacecraft that it could off shuttle flights. The next NSS spacecraft flew almost 2 years after the Challenger accident on the 4-day mission of STS-27 in December 1988. This mission was launched into a 57-degree orbit and had an all-NASA crew, as did the subsequent NSS spacecraft payload missions with only one exception (STS-44 [1991]). No other details on the STS-27 mission have been released.

The launch rate picked up 8 months later with the launch of STS-28 in August and STS-33 in November (both in 1989), followed by STS-36 in February and STS-38 in November (both in 1990). The details of these missions remain classified, but the rapid launch rate—four missions in 15 months—was working off the backlog that had built up during the delays after the Challenger accident. This pace also demonstrated the growing maturity of the NSS/NASA working relationship.

In April 1991, in a departure from the NSS unified approach to classification of its activities on the shuttle, the USAF Space Test Program AFP-675 with the CIRRIS telescope was launched on STS-39. This was the first time in the NSS/NASA relationship that the details of a dedicated DoD payload were released to the world prior to launch. The focus of this mission was Strategic Defense Initiative research into sensor designs and environmental phenomena. The details of this flight and STS-44 in November 1991 were released to the public. Their payloads were from previously publicized USAF programs.



Defense Support Program spacecraft and attached Inertial Upper Stage prior to release from Atlantis on STS-44 (1991). This spacecraft provides warning of ballistic missile attacks on the United States.

STS-44 crew members included an Army payload specialist, Tom Hennan. This mission marked the end of flights on the shuttle for non-NASA military payload specialists. Ironically, Warrant Officer Hennan performed experiments called "Military Man in Space." The spacecraft launched on this mission was the USAF Defense Support Program satellite designed to detect nuclear detonations, missile launches, and space launches from geosynchronous orbit. This satellite program had been in existence for over 20 years. The satellite launched on STS-44 replaced an older satellite in the operational Defense Support Program constellation.

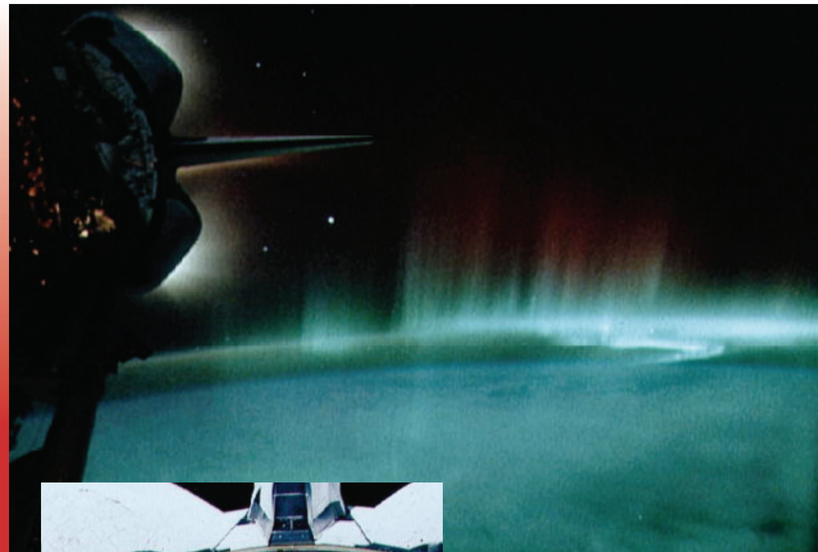
Space Test Program

Another series of experiments, called "M88-1," on STS-44 was announced as an ongoing series of tri-service experiments designed to assess man's visual and communication capabilities from space. The objectives of M88-1

Michael Griffin, PhD
Deputy for technology at the Strategic Defense Initiative Organization (1986-1991).
NASA administrator (2005-2009).

Strategic Defense Initiative Test

"STS-39 was a very complex mission that led to breakthroughs in America's understanding of the characteristics of missile signatures in space. The data we gathered enhanced our ability to identify and protect ourselves from future missile threats. This is one of the most under-recognized achievements of the shuttle era."



View of the Aurora Australis—or Southern Lights—taken by Air Force Program-675 Uniformly Redundant Array and Cryogenic Infrared Radiance Instrumentation during STS-39 (1991). One of the equipment's objectives was to gather data on the Earth's aurora, limb, and airglow.

STS-39's Air Force Program-675 equipment mounted on the experiment support system pallet in Discovery's payload bay.

overlapped those done by Hennan with his experiments; however, NASA Mission Specialist Mario Runco and the rest of the NASA crew performed the M88-1 experiments. This activity used a digital camera to produce images that could be evaluated on orbit. Observations were to be radioed to tactical field users seconds after the observation pass was complete. Emphasis was on coordinating observations with ongoing DoD exercises to fully assess the military benefits of a spaceborne observer. The policy implications of using NASA astronauts to provide input directly to military forces on the ground during shuttle missions have long been debated. This flight and the following mission (STS-53) are the only acknowledged examples of this policy.

A year later in December 1992, STS-53 was launched with a classified payload called "DoD-1" on a 7-day mission. Marty Faga, assistant secretary of the USAF (space), said: "STS-53 marks a milestone in our long and productive partnership with NASA. We have enjoyed outstanding support from the Space Shuttle Program. Although this is the last dedicated shuttle payload, we look forward to continued involvement with the program with DoD secondary payloads."

With the landing of STS-53 at Kennedy Space Center, the NSS/NASA partnership came to an end. During the 10 years of shuttle missions, 11 of the 52 missions were dedicated to NSS programs. The end of NSS-dedicated shuttle missions resulted from the rising costs of shuttle missions and policy decisions made as a result of the Challenger accident. There were few NSS-dedicated missions relative to the enthusiastic plans laid in the late 1970s; however, the Space Shuttle Program had a lasting impact on the NSS programs. While the number of NSS-dedicated missions was small, the partnership between the NSS programs and NASA had a lasting impact.

Legacy of the Space Shuttle Program and National Security Space

The greatest legacy of the NASA/National Security Space (NSS) partnership was at the personal level for NSS engineers and managers. Working on the Space Shuttle Program in the early 1980s was exciting and provided just the sort of motivation that could fuel a career. NSS personnel learned new and different operational and engineering techniques through direct contact with their NASA counterparts. As a result, engineering and operations practices developed by NASA were applied to the future complex NSS programs with great success.

Another significant legacy is that of leadership in the NSS programs. The manned spaceflight engineer program in particular was adept at selecting young officers with potential to be future leaders of the NSS programs. A few examples of current or recent NSS leaders who spent their formative years in the manned spaceflight engineer program include: Gary Payton, Mike Hamel, Jim Armor, Kathy Roberts, and Larry James. Others, such as Willie Shelton, were US Air Force (USAF) flight controllers assigned to work in Houston, Texas.

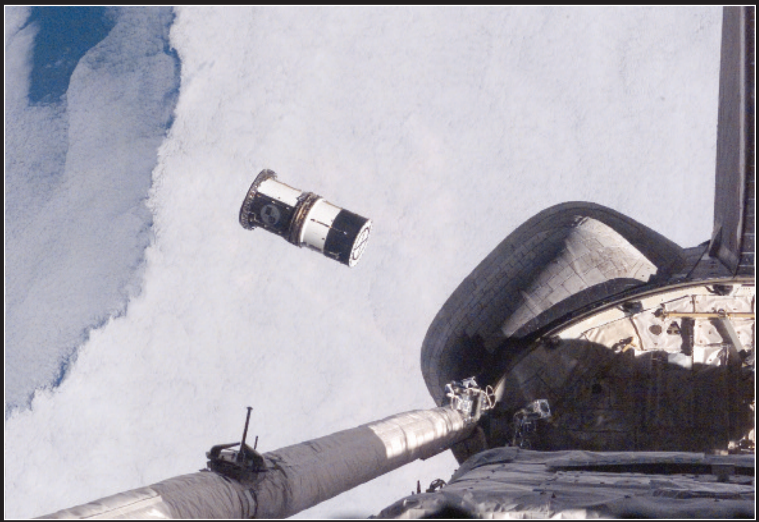
Many military personnel working with NASA returned to the NSS space programs, providing outstanding leadership to future programs. Several ex-astronauts, such as Bob Stuart, John Fabian, and Kevin Chilton, have held or are now holding senior leadership roles in their respective services.

The role that the NASA/NSS collaboration played in the formation of Space Command also left a legacy. While the formation of the USAF Space Command occurred late in the NASA/NSS relationship, close contact between the NSS programs and the shuttle organizations motivated the Department of Defense to create an organization that would have the organizational clout and budget to deal with the Space Shuttle Program on a more equal basis.

The impact on mission assurance and the rigor in operations planning and

US Air Force Space Test Program—Pathfinder for Department of Defense Space Systems

The US Air Force (USAF) Space Test Program was established as a multiuser space program whose role is to be the primary provider of spaceflight for the entire Department of Defense (DoD) space research community. From as early as STS-4 (1982), the USAF Space Test Program used the shuttle to fly payloads relevant to the military. The goal of the program was to exploit the use of the shuttle as a research and development laboratory. In addition to supplying the primary payloads on several DoD-dedicated missions, more than 250 secondary payloads and experiments flew on 95 shuttle missions. Space Test Program payloads flew in the shuttle middeck, cargo bay, Spacelab, and Spacehab, and on the Russian space station Mir during the Shuttle-Mir missions in the mid 1990s.



A Department of Defense pico-satellite known as Atmospheric Neutral Density Experiment (ANDE) is released from the STS-116 (2006) payload bay. ANDE consists of two micro-satellites that measure the density and composition of the low-Earth orbit atmosphere while being tracked from the ground. The data are used to better predict the movement of objects in orbit.

preparation could be the most significant technical legacy the Space Shuttle Program left the NSS programs. NASA required participation by the NSS spacecraft operators in the early stages of each mission's planning. NSS operations personnel quickly realized that this early involvement resulted in improved operations or survivability and provided the tools and experience necessary to deal with the new, more complex NSS spacecraft.

The impact of the Space Shuttle Program on the NSS cannot be judged by the small number of NSS-dedicated shuttle missions. The policy decision that moved all NSS spacecraft onto the shuttle formed a team out of the most creative engineering minds in the country. There was friction between the two organizations, but ultimately it was the people on this NSS/NASA team who made it work. It is unfortunate that, as a result of the Challenger accident, the end of the partnership came so soon. The success of this partnership should be measured not by the number of missions or even by the data collected, but rather by the lasting impact on the NSS programs' personnel and the experiences they brought to future NSS programs.

Another Legacy: Relationship with USSR and Its Allies

In 1972, with the US announcement of the Space Shuttle as its primary space transportation system, the USSR quickly adapted to keep pace. "Believing the Space Shuttle to be a military threat to the Soviet Union, officials of the USSR Ministry of Defense found little interest in lunar bases or giant space stations. What they wanted was a parallel deterrent to the shuttle." Premier Leonid Brezhnev, Russian sources reported, was particularly distraught at the thought of a winged spacecraft on an apparently routine mission in space suddenly swooping down on Moscow and delivering an unthinkably dangerous cargo.

Russian design bureaus offered a number of innovative counter-capabilities, but Brezhnev and the Ministry of Defense were adamant that a near match was vital. They may not have known what the American military was planning with the shuttle, but they wanted to be prepared for exactly what it might be. The Soviets were perplexed by the decision to go forward with the Space Shuttle. Their estimates of cost-performance, particularly over their own mass-produced space launch vehicles, were very high. It seemed to make little practical sense until the announcement that a military shuttle launch facility at Vandenberg Air Force Base was planned; according to one Soviet space scientist, "… trajectories from Vandenberg allowed an overflight of the main centers of the USSR on the first orbit. So our hypothesis was that the development of the shuttle was mainly for military purposes." It was estimated that a military payload could reenter Earth's atmosphere from orbit and engage any target within the USSR in 3 to 4 minutes—much faster than the anticipated 10 minutes from launch to detonation by US nuclear submarines stationed off Arctic coastlines. This drastically changed the deterrence calculations of top Soviet decision makers.

Indeed, deterrence was the great game of the Cold War. Each side had amassed nuclear arsenals sufficient to destroy the other side many times over, and any threat to the precarious balance of terror the two sides had achieved was sure to spell doom. The key to stability was the capacity to deny any gain from a surprise or first strike. A guaranteed response in the form of a devastating counterattack was the hole card in this international game of bluff and brinksmanship. Any development that threatened to mitigate a full second strike was a menace of the highest order.

Several treaties had been signed limiting or barring various anti-satellite activities, especially those targeted against nuclear launch detection capabilities (in a brute attempt to blind the second-strike capacity of the other side). The shuttle, with its robotic arm used for retrieving satellites in orbit, could act as an anti-satellite weapon in a crisis, expensive and dangerous as its use might be. Thus, the shuttle could get around prohibitions against anti-satellite capabilities through its public image as a peaceful NASA space plane. So concerned were the Soviets

Buran/Energiya shuttle and heavy-lift booster, built by the USSR, flew once—uncrewed—in 1988.

with the potential capability of the shuttle, they developed designs for at least two orbiting "laser-equipped battle stations" as a counter and conducted more than 20 "test launches" of a massive ground-launched anti-satellite weapon in the 1970s and 1980s.

In the 1978-1979 strategic arms limitation talks, the Soviets asked for a guarantee that the shuttle would not be used for anti-satellite purposes. The United States refused. In 1983, the USSR offered to prohibit the stationing of any weapons in space, if the United States would agree. The catch was the shuttle could not be used for military activities. In exchange, the Soviets would likewise limit the Mir space station from military interaction—an untenable exchange.

So a shuttle-equivalent space plane was bulldozed through the Soviet budget and the result was the Buran/Energiya shuttle and heavy-lift booster. After more than a decade of funding—and, for the cash-strapped Soviet government, a crippling budget—the unmanned Buran debuted and flew two orbits before landing flawlessly in November 1988. Immediately after the impressive proof-of-concept flight, the Soviets mothballed Buran.

James Moltz, professor of national security at the Naval Postgraduate School, commented that the "self-inflicted extreme cost of the Buran/Energiya program did more to destabilize the Soviet economy than any response to the Reagan administration's efforts in the 1980s." If so, the Space Shuttle can be given at least partial credit for winning the Cold War.