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INTRODUCTION

Mr. Chairman, Members of the Subcommittee, and Staff, I very much appreciate the opportunity to provide written testimony on the Fiscal Year 2004 Air Force Science and Technology (S&T) Program. The United States Air Force is transforming to a capabilities-focused Expeditionary Air and Space Force. We are doing this through the development of the Concept of Operations for each of the seven major tasks the Air Force must be capable of accomplishing. Our goal is to make the warfighting effects and the capabilities we need to achieve them the drivers for everything we do. This is especially true in our S&T Program. We have taken the effects and capabilities required by the seven Concepts of Operations and mapped them to the Long-Term Challenges and Short-Term Objectives identified in the Congressionally-directed S&T Planning Review completed in February 2002. Not surprisingly, we have a high correlation between our S&T programs and the capabilities required by these Concepts of Operations. This is because the Air Force Research Laboratory (AFRL) closely links the technologies reflected in its S&T Plan to warfighter capability needs.

The United States Air Force is committed to a robust S&T Program that enables us to achieve our vision of becoming an integrated air and space force capable of rapid and decisive global engagement. By continuing our investment in transformational technologies that support a reduced cycle-time, spiral development acquisition process, the Air Force will retain its dominance of air and space in future conflicts, against both traditional and asymmetrical threats.

Innovation is a vital part of our heritage and is key to ensuring the Air Force will meet the challenges of tomorrow. Transforming our warfighting capabilities towards this end will involve continued innovations in how we think about employing our forces to defend our nation, as well as quantum leaps in our technology. We must be prepared to counter regional instabilities, the

worldwide availability of advanced weapons, and other emerging and less predictable asymmetrical threats. We are developing transformational technologies that permit flexible forces to operate far from home, on short notice, and for extended time periods. However, we must also be able to afford these innovations once we develop them in order to re-capitalize the Air Force to fulfill our vision. To meet these objectives, we search out the most promising and affordable technologies in order to win decisively, protect our forces, and minimize collateral damage.

S&T BUDGET/SENIOR LEADERSHIP INVOLVEMENT

We have been faced with the reality of a fiscally-constrained, but operationally-demanding environment. The high operations tempo the Air Force has sustained in support of peacekeeping operations and conflicts, such as Afghanistan, has placed a great burden on our people and system.

In spite of these requirements, the Air Force is working to increase S&T funding, while maintaining a balanced S&T portfolio. The Air Force Fiscal Year 2004 President's Budget (PB) request for S&T is $2.2 billion, an increase of more than $535 million from the Fiscal Year 2003 PB. The most significant change in the S&T PB request results from the devolvement of $350 million for several Office of the Secretary of Defense efforts to the Air Force S&T Program. This includes the High Performance Computing Modernization program, the University Research Initiative program, and the High Energy Laser program. Another significant addition to S&T in Fiscal Year 2004 is over $150 million for the National Aerospace Initiative.

The Air Force understands the concerns of Congress regarding the level of support for these devolved programs and is working hard to ensure execution of the programs transferred to

the Air Force continues to support the diverse multiple military objectives inherent in each of these programs. Further, the Office of the Secretary of Defense will continue to provide policy guidance and oversight for these efforts.

In a separate action, the Seismic Research Program for detection of nuclear explosions has been transferred back to the Air Force from the Defense Threat Reduction Agency (DTRA). The Air Force is working to reclaim the knowledge and experience it possessed before transfer of the program to DTRA in 1997.

One area in which the Air Force has increased its investment is in space communications technology with initiation of the transformational communications technology development program. This program will identify, develop, and demonstrate the wideband technologies needed to build a space-based laser communications network that could provide higher data throughput and higher frequencies, thus transforming our military satellite communications infrastructure.

In conjunction with the increase in S&T funding, there has also been a significant increase in the involvement of the warfighting commands and senior Air Force leadership in the planning, programming, and prioritizing of Air Force S&T. For example, we have conducted S&T Summits where the Secretary of the Air Force, the Air Force Chief of Staff, and the Air Force four-stars and other senior leaders review the S&T portfolio. The latest S&T Summit focused on transformational technologies that can be developed to assist in combating terrorism and other asymmetrical threats.

WORKFORCE

The Air Force scientist and engineer (S&E) workforce is another area where senior Air Force leadership involvement plays a pivotal role. Both Secretary Roche and Gen Jumper are deeply involved in shaping our future S&E workforce. Air Force civilian and military S&Es are highly motivated and productive. The Air Force is unique in that 20 percent of its laboratory S&E government workforce is active duty military. This gives us a direct link to the warfighter. Some of these military S&Es come directly from operational commands, while others will serve in operational commands later in their careers.

The Air Force is committed to shaping its S&E workforce with the vision to enhance excellence and relevance of S&T into the 21st Century and appreciates the support Congress has already provided. This challenge requires the Air Force to maintain a dominant edge in technology and also requires us to provide clear direction and growth for our S&E workforce. However, we, as do others, find it is difficult to recruit and retain S&Es. The Air Force has several initiatives, both civilian and military, that address recruitment and retention issues.

AFRL was the first laboratory in the Department of Defense (DoD) to take advantage of legislation allowing us to experiment with alternative personnel management systems for our civilian S&Es. The simplified classification system, broadband pay levels, and contribution-based compensation that form the cornerstone of the Air Force Laboratory Demonstration Project have provided AFRL with some key flexibilities needed to compete with private industry for critical S&E talent and properly compensate our high contributors. We will need to consider these flexibilities as we develop the National Security Personnel System (NSPS).

We have found that our centers have the greatest difficulty in recruiting high quality minority member scientific and engineering candidates. We have implemented a command-wide

recruitment program targeting this group of highly sought after candidates. The following is a list of national career fairs that we have attended or plan to attend this year: Black Engineer of the Year Award Conference; Society of Hispanic Professional Engineers Conference; National Society of Black Engineers Conference; and Hispanic Engineering National Achievement Awards Conference. We provide the resumes that we obtain from these conferences to our center civilian personnel offices as a ready source of high quality applicants. This targeted recruitment, in conjunction with the hiring flexibilities of the Federal Career Intern Program, is enabling us to make more timely offers to highly sought after S&E graduates. To ease the confusion that applicants for the Air Force Material Command (AFMC) positions can experience, we developed a public web page, which explains what we have to offer and how to apply for specific vacancies. The page links to each center's public web page for more detailed center explanations.

Other civilian initiatives include the recruitment of college students with critical S&E skills via recruiting incentives, a robust marketing effort, and a co-op central funding program that hires college students while still in school. Central funding for recruiting bonus and retention allowances for journeyman level S&Es also promises to provide much needed assistance with civilian recruitment and retention.

On the military side, we're employing the Airman Education and Commissioning Program and the Technical Degree Sponsorship Program to recruit additional S&Es into the military workforce. Bonus programs such as the Critical Skills Retention Bonus are essential to shrinking the current shortfall of military S&Es within the Air Force and the Air Force is currently exploring additional bonus programs.

The Air Force is committed to its S&Es and recently published a "Concept of Operations for Scientists and Engineers in the United States Air Force." We also baselined the requirement for the Air Force S&E workforce and, upon analyzing this baseline requirement, found that while our military and civilian authorizations were about right, our actual demographics were seriously short in some key areas. As such, we are shifting our focus to retaining the workforce we have and infusing it with the vitality of new S&Es to meet tomorrow's need. During the next seven years, we are investing nearly a third of a billion dollars to support the retention and reshaping of our technological workforce. As we replenish our S&E workforce, we are providing career guidance and mentoring that will enable us to meet our 21st Century challenge. Initiatives, such as the special hiring legislation authorized by Congress in PL 106-398, which provides "DARPA-like" hiring authority to the Military Departments, should also produce positive results in shaping our S&E workforce. This authority has only recently been delegated to the Air Force, but we are optimistic about its potential. And, again, we express our thanks to Congress for your continued support.

MAXIMIZING OUR S&T DOLLARS

We will continue to leverage technology to achieve new levels of combat effectiveness. Our strategy is to pursue integrated technology capabilities that support our warfighter's highest priority needs. We must also pursue the fundamental enabling technologies that will improve tomorrow's Air Force. As technological superiority is increasingly a perishable commodity, we work hard to optimize our S&T funding, by not only "inventing the future" ourselves, but also by speeding the introduction of new technologies to our warfighters.

One way we are doing this is through our Applied Technology Councils and the Advanced Technology Demonstrations (ATDs). The councils are composed of two- and three-star representatives from AFRL, our acquisition product centers, and our major user commands who formally prioritize ATD programs. We hold an Applied Technology Council meeting with each Major Command twice every year and have commissioned 34 ATDs that have transition funding in the Fiscal Year 2003 budget. The Applied Technology Council process is extremely important in linking the S&T Program to both the system developers and the operational user. This process facilitates technology transition to operational use and secures user commitment for resources to do systems design and development and fielding of the technology. Currently about fifty percent of our Advanced Technology Development (6.3) budget is committed to these programs.

Since deployed technology may remain in use for decades, the Air Force S&T Program not only focuses on enhancing performance, but also on sustaining our fielded warfighter capabilities. Emphasizing affordability from the very beginning through training of our management, and science and engineering staff, as well as through an in-depth review of technology development efforts, increases our potential to reduce the costs of technology early in the system development process and throughout a product's life cycle.

We maintain an excellent balance of military, civilian, and contractor expertise, which allows us to be very selective about investing in high payoff technological opportunities. We constantly seek opportunities to integrate Air Force planning and leverage our S&T funds by cooperating with other Services, Agencies, the private sector, and international partners. For example, we rely on the Army as the lead Service for defensive chemical-biological technology development. The Air Force also has strong inter-Agency efforts, such as our program in aging

aircraft, which is focused on detection and management of corrosion and fatigue in aging structures. It is closely coordinated with the civilian aging aircraft research programs at the National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA). Our partnership with the industrial and university research base is very strong. In fact, we outsource over seventy percent of our S&T funding. Finally, the Air Force is involved in international cooperative technology development efforts for S&T, such as the software defined radio development, insensitive high explosives, and aircraft battle damage repair efforts conducted with France, Germany, and the United Kingdom. Another example of international cooperation is the multi-domain network management program with Australia and Canada. This program is developing the concepts and tools for creating and managing secure computer networks with our coalition partners.

WORLD CLASS RESEARCH

The quality of our program is assessed by the Air Force Scientific Advisory Board (SAB) through yearly reviews. The SAB conducts an in-depth review of half of the S&T Program each year, covering the entire program over a two-year period. Twelve technical areas have been identified as world class research during the last cycle of reviews -- let me highlight a few of these areas that were identified as world class.

The Directed Energy Directorate's Starfire Optical Range at Kirtland Air Force Base, New Mexico, is leading the adaptive optics research for use in large ground-based telescopes to image satellites and propagate laser beams through the atmosphere. This will enable high-quality, ground-based observations of space objects and propagation of laser beams through a

turbulent atmosphere. Astronomical images using this technology can rival those obtained with the Hubble Space Telescope.

Our Propulsion Directorate's Hypersonics Technology (HyTech) work at Wright-Patterson Air Force Base, Ohio, is acknowledged by the SAB as world class and a cornerstone of the Office of the Secretary of Defense's Director of Defense Research and Engineering's (DDR&E's) National Aerospace Initiative. Our HyTech program has continued to advance the state of the art in scramjet engines and conducted the first ever ground test demonstration of a scramjet producing positive net thrust back in 2001. In February 2003, HyTech tested a flight weight scramjet Ground Demonstration Engine operating at Mach 4.5. While the 2001 Performance Test Engine used copper heat-sink hardware and weighted 1,500 pounds, the 2003 Ground Demonstration Engine used JP-7 fuel to cool the scramjet engine walls and weighed less than 150 pounds. This marked another first for the HyTech program—demonstrating the structural durability of a hydrocarbon fueled, actively cooled scramjet. Testing at Mach 6.5 will start in March 2003 and should be completed in April 2003. Pratt & Whitney developed this particular engine in collaboration with Air Force scientists and engineers.

Another SAB-rated world-class research program is the Warfighter Skill Development and Training efforts worked by our Human Effectiveness Directorate at Brooks City-Base, TX. Specific research areas include Integrated Panoramic Night Vision Goggle (PNVG) and Distributed Mission Training. The Integrated PNVG will improve situational awareness and terrain avoidance at night through its wider field of vision and improved resolution. It will also provide protection from laser target designators, laser rangers, and laser threats through compatibility with existing laser eye protection technologies. Distributed mission training will provide an integrated set of training, simulation, and mission rehearsal technologies that will

improve warfighter capabilities and mission readiness by enhancing operator and team performance skills. Technologies will increase operational readiness by providing more effective methods and approaches to train and assess personnel. These technologies will contribute to a more highly trained and flexible cadre of personnel at a reduced cost.

Working closely with operational users, AFRL researchers in the Materials Directorate at Wright-Patterson Air Force Base, Ohio, continue to develop and transition new filter technologies that provide improved eye protection for aircrews from varied levels of laser threats. The Laser Eye Protection program is enabling aircrews to conduct day and night air operations without visual jamming or personal injury.

Our research in Electro-Optic Warfare at Wright-Patterson Air Force Base, Ohio, will allow future laser-based sensor systems to penetrate moderate cloud cover, obscurants, and camouflage. This will provide improved target detection and identification for our weapons systems. "See and Avoid" sensors will ease restrictions on unmanned air vehicle operations in civilian airspace and allow autonomous operation in conjunction with manned aircraft. These technologies may also be applied as low-cost missile warning sensors to affordably protect military and commercial aircraft from surface-to-air missiles. Also, experimental research in infrared countermeasures is developing threat adaptive techniques for robust defeat of current and future infrared weapons and sensors.

Space Weather research at Hanscom Air Force Base, Massachusetts, is another SAB-rated world class operation. We have a strong modeling capability that specifies and forecasts space weather from the Sun to the ionosphere. Assessment capability of space environment and its effects using compact sensors will be incorporated into a high energy particles sensor that is under development.

At Edwards Air Force Base, California, the Propulsion Directorate is working on world class research in polynitrogen propellants. The goal is to enable high performance monopropellant rocket propulsion systems with revolutionary performance. By improving the specific impulse of the propellant, we will have environmentally benign exhaust and reduced signatures. This could potentially improve storage, manufacturing, and rocket engine size.

COMBATING TERRORISM

While the traditional focus of S&T has been on developing long-term capabilities, the Air Force S&T Program also contributes to the current needs of the nation and our troops deployed in hostile areas. One example of an Air Force project receiving a great deal of attention since 9/11 is the Exterior Explosive Blast Coating polymer, which was developed by the Air Force to protect key buildings and installations from close proximity explosions, such as air dropped weapons or truck bombs. This easy-to-apply spray coating provides greater structural integrity of exterior walls and prevents dispersion of debris as well as separation of wall elements. This coating is currently being applied to the interior of the outer walls of the Pentagon.

Another transformational effort is the Vehicular Mounted Active Denial System (VMADS). The VMADS is being jointly developed with the U.S. Marine Corps and is a defensive millimeter wave system used for perimeter defense applications. It is a directed energy weapon that emits a non-lethal, non-damaging beam, which heats up the skin of a potential enemy when in close proximity to the system. The resulting temporary pain causes the person to flee.

In the war on terror, Air Force Special Tactics Combat Controllers are changing the very nature of warfare. By performing operations deep in enemy territory, they help determine who

the terrorists are, where their weapons are located, and who the innocent civilians are. Then, they precisely control the elements of airpower to defeat the terrorist threat, while taking care to spare innocent civilian casualties and minimize collateral damage. Then, these same Special Tactics Combat Controllers are there to provide instant battle damage assessment. We call these deep engagements, "Battlefield Air Operations (BAO)".

AFMC is providing needed help for these brave Special Tactics Warriors. The Air Force Research Laboratory is accelerating new technology to these Special Tactics Warriors in the form of significant improvements to their BAO Kit of equipment. The Aeronautical Systems Center is providing a Special Tactics System Program Office to assist in rapid procurement of these new BAO Kit items. The Electronic Systems Center is helping to ensure these new digital machine-to-machine data communications are interoperable with the rest of our Global Grid of military command & control communications systems. As a result of this AFMC-wide enterprise, our Special Tactics Warriors will soon have a digital machine-to-machine capability that helps to quickly connect the right aircraft, with the right munitions, guided precisely to the right target, at just the right time, to achieve the desired effect. This new automated process helps to reduce the time it takes to target the terrorist threat, while at the same time reducing human error in the targeting process.

Working collaboratively with the Special Tactics Warriors, this AFMC "BAO TIGER TEAM" has also partnered with a national team of industry to field significant enhancements of increased capability, while reducing the weight and size of the individual BAO Kit equipment. They are performing these improvements by developing, prototyping, testing, building, and fielding these BAO Kit improvements in very rapid spirals. These new BAO capabilities will

help to save American Lives, and the lives of innocent civilians. BAO provides a revolutionary and highly effective way to combat the terrorist threat.

One of the premier munitions almost ready to transition from the munitions lab at Eglin Air Force Base into acquisition is Crash PAD (Prompt Agent Defeat). The objective of the Crash PAD program is to demonstrate a blast/frag multi-purpose warhead that can be used to damage fixed biological and chemical targets while producing an environment that will mitigate bio agent collateral damage. The range of applicable targets includes soft to moderately hardened. Sled track testing occurred in late January and flight test occurred in late February. This program has the potential to be a significant resource for the warfighter in destroying chemical and biological weapons with minimal effects to civilians.

TRANSFORMATIONAL TECHNOLOGIES

There are many other Air Force technology areas that deserve special mention. Let me highlight just a few examples. As mentioned earlier, there's our transformational communications technology development program, whose laser communications technology efforts promise to increase data transfer rates at least ten-fold compared to current radio frequency communications systems. Additionally, laser communications uses a narrow beam, which decreases the likelihood of intercept and increases resistance to jamming. While laser communications have a high potential to revolutionize satellite communications, there are technical challenges to overcome such as precision pointing and tracking, weather constraints, and adapting the equipment for use in space. We continue to work on the technology challenges and are also conducting a study to determine the best architecture for implementing laser communications technologies to complement and integrate with radio frequency-based systems.

To increase aircraft survivability and operational efficiencies, the Air Force is developing both manned (F/A-22 and Joint Strike Fighter) and unmanned flight vehicles that can carry and employ weapons from both external and internal weapons bays. To increase the number of weapons the flight vehicle can fit into their internal weapons bays, part of our investment strategy focuses S&T funding on developing and demonstrating smaller precision weapons.

One of the small munitions currently being flight demonstrated at Eglin Air Force Base is the Low Cost Autonomous Attack System (LOCAAS). The LOCAAS is a 100-pound class powered munition of which the primary target set is moving and relocatable targets. This Advanced Technology Demonstration (ATD) program will demonstrate the effectiveness and military utility of this type of munition for the Lethal Suppression of Enemy Air Defenses (SEAD), Theater Missile Defense (TMD) Attack Operations, and Armor/Interdiction mission areas. LOCAAS will integrate a laser radar precision terminal seeker with autonomous target recognition algorithms, a multi-modal warhead, Global Positioning System (GPS)/Inertial Navigation System (INS) mid-course guidance, and a miniature turbine engine with a fly-out range of 100 miles. This ATD program will complete five flight tests by the end of Fiscal Year 2003, culminating in a planned autonomous flight with active seeker and warhead against a real target. The first flight test was successfully completed on February 4, 2002, and demonstrated the powered flight envelope, GPS waypoint navigation, and simulated attack of a SEAD target. The second flight test, successfully completed on November 4, 2002, was a guided LOCAAS that demonstrated real-time autonomous search, and automatic target acquisition algorithms that could detect, identify, and simulate attack against a TMD target.

Plans are also being made in Fiscal Year 2004 to conduct a cooperative program with the Royal Australian Air Force (RAAF) using the LOCAAS vehicle. A test program on the RAAF F-111 aircraft in Australia is scheduled for the first quarter of the fiscal year. This will be an important test for both nations – the U.S. is able to test munitions release at supersonic speeds and Australia benefits from the test results. These results could enable maturation of the computational simulation codes for separation of symmetric and asymmetric miniature weapons, providing for a reduction in the risk and cost of weapons certification efforts for aircraft with internal weapons bays such as the F/A-22, Joint Strike Fighter, and UCAVs.

To continue the trend of miniaturization of space platforms, the Air Force and Defense Advanced Research Projects Agency (DARPA) have provided funding to ten universities to explore the military utility of innovative, low-cost nanosatellites. These nanosatellites, weighing two to ten kilograms, could demonstrate efforts such as differential Global Positioning System navigation, miniaturized sensors, and micropropulsion technologies. In December 2002, two "pico satellites" weighing slightly more than two pounds each, were successfully released from a specialized spring-loaded launcher assembly mounted on the sidewall of the Space Shuttle Endeavor. This was the joint Air Force/DARPA-developed PICOSAT Inspector experiment to demonstrate a significant step forward in the development of an on-board autonomous inspection capability.

The Air Force is also conducting the Experimental Satellite System (XSS) series to demonstrate increasing levels of microsatellite technology maturity. The XSS-10, the first microsatellite in the series launched on schedule during Fiscal Year 2003. It demonstrated semi-autonomous operations and visual inspection in close proximity of an object in space — in this case a Delta II upper stage. In Fiscal Year 2004, we plan to launch XSS-11, which will

demonstrate autonomous operations and provide experience with command and control in proximity operations to another space object.

One of the most transformational and quickly deployable technologies available today is command, control, and communications technology, also known as information technology. This technology is at the heart of our Moving Target Indicator Exploitation program, which is developing web-enabled automated tools to exploit data from current and future sensor systems such as the Joint Surface Target Attack Radar System, better known as JSTARS. The effort is focused on four technology areas: ground moving target tracking; motion pattern analysis; behavioral pattern analysis; and sensor resource allocation and scheduling, which provide the capability to track moving targets and get the information to the operations center. This system is in southwest Asia today.

BREAKTHROUGH TECHNOLOGIES

In recent years, we have all come to appreciate the success of unmanned vehicles. We hear over and over again the tremendous operational advantages that systems such as Predator and Global Hawk are bringing to warfighters from all Services. Over the first two decades of the 21st Century, advances in micro unmanned air vehicles will provide significant additional capabilities to our Armed Forces. Micro air vehicles utilize advances in microscale aerodynamics, electronic miniaturization, munitions, and propulsion to package sensory and weapons payloads into highly reliable, on-demand systems. These systems will provide unprecedented levels of situational awareness in the most severe threat environments. Whether we are operating in urban environments, sensing bio-chemical dispersion through the atmosphere, or looking over the next hill, our troops will have the awareness needed to fight and

survive. These systems will provide the persistent intelligence, surveillance, and reconnaissance in high threat environments needed by our troops on the ground and our airmen in the air. When called for, swarms of these vehicles will cooperate together to generate both lethal and nonlethal effects.

In the next 50 years, advancements in nanotechnology will provide the greatest change in how man operates since the invention of powered flight itself. Nanotechnology is a science and a series of disciplines that works at the atomic and molecular level to create structures, materials, and devices through improved molecular organization. By working with elements at the level of nanometer scale, we have access to the building blocks of nature. This will fundamentally change the way materials and devices will be produced in the future. The ability to synthesize nanoscale building blocks with precisely controlled size and composition and to then assemble them into larger structures with unique properties and functions will revolutionize segments of the materials and device industry. The benefits that nanostructuring can bring include lighter, stronger, and programmable materials; reductions in life cycle costs through lower failure rates; innovative devices based on new principles and architectures; nanosensors and nanoprocessors; and use of molecular/cluster manufacturing, which takes advantage of assembly at the nanoscale level for a given purpose.

Another significant breakthrough technology that will change the way we develop systems is our work in biotechnology. Biology has developed unique materials and processes that may be exploited in non-biological systems. We are studying the fundamental science necessary to incorporate biological components and organisms into Air Force systems. For example, in biomemetics, we research the adaptation of natural biological sensor in reptiles. The

natural infrared sensors in reptiles do not need to be cooled. We hope to adapt this biological process to Air Force sensor applications that normally require cryogenic cooling.

TECHNOLOGY TRANSITION

The majority of Air Force S&T is contracted with industry and universities. This promotes relationships between the scientists and engineers conducting the research and lays the foundation for technology transition. Strong connections between the technology supplier and the end user help speed transition of technology to the warfighter. In addition, the various transition programs in which the Air Force participates further cement this foundation. Air Force technology transition efforts include Advanced Technology Demonstration projects, Small Business Innovation Research (SBIR) contracts, and Cooperative Research and Development Agreements (CRADAs) among others.

The Applied Technology Councils discussed earlier were initiated in Fiscal Year 1999 to foster top-level user involvement in the transition of technology from the laboratory to the system developer to the operational user. As noted, these Councils review and approve Air Force Advanced Technology Demonstration projects and ensure that the Major Commands plan for the transition of successful technology by tying approved Advanced Technology Demonstration projects to planned Major Command Future Years Defense Program funding.

Another Air Force technology transition tool is the SBIR program, which funds early-stage efforts at small technology companies. These programs serve a defense need, but also have the potential for private sector and/or military market commercialization. A similar program, the Small Business Technology Transfer (STTR) program, funds cooperative efforts involving a small business and a research institution (i.e., a university), a federally-funded research and

development center, or a non-profit research institution. A CRADA is an agreement between a government laboratory and a non-federal party under which the laboratory provides personnel, facilities, equipment, or other resources (but not funds) with or without reimbursement and the non-federal party provides funds, people, services, facilities, equipment, or other resources to conduct specific research and development efforts that are consistent with the agency's mission.

These efforts along with many other programs, such as Dual-Use S&T, Independent Research and Development, Mentor-Protégé, Personnel Exchanges, etc., are mutually beneficial to the Air Force and the contractors and universities with whom we collaborate. Technology transition is a key component of the Air Force S&T Program and is vital to our pursuit of national security requirements.

SECTION 253 STUDY

Section 253 of the National Defense Authorization Act for Fiscal Year 2002, Public Law 107-107, directed the Air Force, in cooperation with the National Research Council of the National Academy of Sciences, to carry out a study to determine the effect of S&T program changes of the past two years. The Air Force Science and Technology Board (AFSTB) of the National Research Council will prepare a written report for the Secretary of the Air Force to forward to Congress by the May 1, 2003, deadline. While we do not have any insight into the AFSTB study results, we expect this study will reflect the positive impact of changes instituted by the Air Force in its S&T planning process.

CONCLUSION

In conclusion, the Air Force is fully committed to providing this nation with the advanced air and space technologies required to meet America's national security interests around the world and to ensure we remain on the cutting edge of system performance, flexibility, and affordability. The technological advantage we enjoy today is a legacy of decades of investment in S&T. Likewise, our future warfighting capabilities will be substantially determined by today's investment in S&T. As we face the new millennium, our challenge is to advance technologies for an Expeditionary Aerospace Force as we continue to move aggressively into the realm of space activities. The Air Force is confident that we can lead the discovery, development, and timely transition of affordable, transformational technologies that keep our Air Force the best in the world. As an integral part of the Department of Defense's S&T team, we look forward to working with Congress to ensure a strong Air Force S&T Program tailored to achieve our vision of an integrated air and space force.

Mr. Chairman, thank you again, for the opportunity to present written testimony, and thank you for your continuing support of the Air Force S&T Program.