DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE SENATE ARMED SERVICES COMMITTEE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

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SUBJECT: Fiscal Year 2002 Air Force Science and Technology

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Mr. Chairman, Members of the Subcommittee, and Staff, the United States Air Force is committed to a robust Science and Technology (S&T) Program that enables us to achieve our vision of an integrated air and space force capable of rapid and decisive global engagement. In 1944, General Hap Arnold, the "founding father" of the United States Air Force, stated, "The first essential of air power is pre-eminence in research." This was true in 1944 and it is still true today. By continuing our investment in a broad and balanced selection of technologies, the Air Force will retain its dominance of air and space in future conflicts.

Innovation is vital part of our aviation heritage and it is the key to ensuring the Air Force will meet the challenges of tomorrow. We must be prepared to counter the worldwide availability of advanced weapons, wide-ranging activities, increasing regional instabilities, and other emerging and less predictable threats. We are developing leap ahead technologies that permit flexible forces capable of operating far from home on short notice. We must also be able to afford these innovations once we develop them in order to transform the Air Force to fulfill our vision. To meet these challenges, we search out the most promising and affordable technologies in order to win decisively, protect our forces, and minimize collateral damage.

THE AIR FORCE S&T PROGRAM

The current Air Force S&T Program uses guidance from the National Military Strategy, Defense internal planning documents, Joint Staff guidance, and the Air Force Strategic Plan to focus our S&T investment. The resulting Air Force S&T Plan establishes a program that is balanced across our investments in Basic Research, Applied Research, and Advanced Technology Development, as well as across a diverse number of technology areas and the basic sciences. We balance our investment in long-range research yielding potential breakthrough technology with efforts to meet the more near-term needs of the operational warfighting commanders.

To ensure program relevance, we involve system developers and warfighters to focus our efforts on the warfighters' most urgent needs. Finally, to ensure the technical quality of the program, the Air Force Scientific Advisory Board, the Department of Defense Reliance Technology Area Review and Assessment teams, the Defense Science Board, and other peer groups regularly review, evaluate, and critique our S&T programs. We feel that the result is an S&T program of validated high quality and relevance.

S&T PLANNING PROCESS

In regards to our planning, I am pleased to be able to give you an update on our S&T planning review that we have undertaken in response to Section 252 of Public Law 106-398, the National Defense Authorization Act for Fiscal Year 2001. We have approached this review enthusiastically and have received overwhelming participation from, not only the Air Force S&T community, but the requirements, planning, logistics, and user communities as well. Currently, we have over 250 people involved in this review: approximately 140 from the S&T community; 60 from the requirements, plans, and logistics communities; and 50 from the user community.

As you required us to do, the S&T planning review will identify the short-term objectives and long-term challenges of the Air Force S&T Program. The review includes an assessment of the budgetary resources that are being used to address the short-term objectives and long-term challenges; the budgetary resources that are necessary to adequately address those objectives and challenges; and a course of action for each projected or ongoing Air Force S&T program that does not address either the short-term objective or the long-term challenge.

The review has been divided into three distinct phases of activity. Phase I focused on identifying the objectives and challenges. This work was largely accomplished in the January through April timeframe and was completed last week when the Air Force Council approved the objectives and challenges. Phase II concentrates on in-depth investigations and analyses of the work that needs to be accomplished in order to meet the short-term objectives and long-term challenges. Integrated Product Teams and workshops have been formed to examine each short-term objective and long-term challenge, respectively. These results will also be briefed to the Air Force Corporate Structure and at the next Air Force S&T Summit in September. Phase III completes the review with an outbrief to the Secretary of the Air Force to enable the results to be communicated to the Secretary of Defense and the Comptroller General.

The Short-term Objectives that have been approved by Air Force leadership are: Target Location, Identification, and Tracking; Command, Control, Communications, Computers, and Intelligence; Precision Attack; Space Control; Access to Space; Aircraft Survivability and Countermeasures; Sustaining Aging Systems; and Air Expeditionary Force Support. The Long-term Challenges receiving similar approval are: Finding and Tracking; Command and Control; Controlled Effects; Sanctuary; Rapid Aerospace Response; and Effective Aerospace Persistence.

I am convinced that this effort will provide both a short-term, as well as a long-term focus to our S&T Program. The all-encompassing nature of the review has produced a set of objectives and challenges that reflect the enduring missions and capabilities that the Air Force provides to the Joint Force Commander. Further, they also draw from a broad range of technologies for their potential solution.

Also, contributing to my enthusiasm for the review is the fact that it is closely coupled to other key Air Force documents. For example, the short-term objectives and long-term challenges are closely linked to the Air Force Core Competencies and operational mission areas. Indeed the short-term objectives and long-term challenges related to Command and Control are directly linked to all six of the Air Force Core Competencies. Mastering the Core Competencies makes possible the achievement of Global Vigilance, Reach, and Power, the key elements of the Air Force Vision 2020. Thus the clear connectivity of the S&T objectives and challenges to the Air Force Core Competencies ensure that the Air Force S&T program is directly supporting the Air Force Vision. Results of this review will be used to update the Air Force S&T Plan, and they will also be an important input to the next update of the Air Force Strategic Plan.

Today, the execution of our S&T effort is the responsibility of the Air Force Research Laboratory (AFRL). Their mission it is to lead the discovery, development, and integration of affordable warfighting technologies for our aerospace forces. We are proud of AFRL, its people, programs, and facilities. It conducts a vigorous S&T Program in the following areas: basic research; propulsion; sensors; space vehicles; materials and manufacturing; human effectiveness; information; directed energy; air vehicles; and munitions. The S&T planning review effort that you have directed us to undertake will strengthen this Program as we move forward into what promises to be an exciting and challenging period for our nation.

S&T BUDGET

The single most important factor to strengthening the Air Force S&T Program is an overall increase in the Air Force topline funding. 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 Kosovo, has placed a great burden on our people and resources and strained our ability to maintain current readiness and make necessary future investments such as S&T.

In spite of these tight budgets, the Air Force is working hard to increase S&T funding and maintain a balanced S&T portfolio. In conjunction with this, there has been a significant increase in the involvement of the warfighting commands and senior Air Force leadership in S&T budgeting decisions. We have established twice yearly S&T Summits where the Secretary of the Air Force, the Air Force Chief of Staff, and the Air Force four-stars review the S&T portfolio and new initiatives. The first two reviews resulted in increased emphasis for research on sensors and information technology to advance our ability to find and attack Targets-Under-Trees; for accelerated materials development for improved Laser Eye Protection devices; for accelerating development of the Joint Battlespace Infosphere; and for completing important beam control demonstrations for our Directed Energy program.

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 solutions 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 stretch 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, senior-level representatives of the AFRL, our acquisition product centers, and our major user commands. Their focus is on assessing the quality, utility, and time-phasing of our ATDs. These councils are ensuring that up-front, documented planning by all stakeholders takes place to improve the probability that a demonstrated technology will transition out of the laboratory to the customer. This new process will ensure AFRL pursues those ATDs with the highest user support and transition funding. We hold an Applied Technology Council meeting with each Combat Command every year, and have commissioned 22 ATDs that have transition funding in the Fiscal Year 2002 budget, and 30 potential ATDs that we are still working to fund in outyear budgets. The Applied Technology Council process has significantly contributed to focusing the S&T Program on warfighter needs by bringing direct operational input into development of a responsive and relevant demonstration program.

Since deployed technology may remain in use for decades, the Air Force S&T Program not only focuses on enhancing performance, but we have also increased our emphasis on the reliability, maintainability, and affordability of weapon systems. Emphasizing affordability from the very beginning through training of our management and engineering staff, as well as through careful review of technology transition pilot projects, increase our potential to reduce the costs of technology early in the process and throughout a product's life cycle.

We are very selective about investing in the appropriate technological opportunities. We constantly seek opportunities to integrate planning by the Air Force 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 chemical-biological technology research. The Air Force also has strong inter-Agency efforts such as our program in aging aircraft, which is focused on detection and amelioration 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 and Federal Aviation Administration. Finally, the Air Force is closely involved in international technology cooperative efforts for S&T such as the cooperative technology development programs with France, Germany, and the United Kingdom in tactical missile propellants, insensitive high explosives, and aircraft battle damage repair. Another example of international cooperation is the bi-lateral work we are doing with the United Kingdom on developing a novel new target detection device, fuze, and warhead integration concept.

International cooperative efforts help us increase the number of sources for innovative ideas and transition new capabilities to the warfighter. A key example is our extensive involvement with the NATO Research and Technology Organization, which oversees all of the cooperative military research the nineteen NATO members and the Partnership for Peace nations wish to share with each other. I sit on governing board of this group along with Dr. Etter, who is the senior US representative, and Mr. Dan Mulville from NASA. At the next level are seven major technical panels each of which include three U.S. senior scientists and engineers. Finally, we have close to a hundred of our folks participating at the technical team level. This cooperation in the early stages of technology development also helps to ensure any ensuing technology product will be interoperable with the equipment of potential allies in coalition operations.

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 Air Force has been the world leader in developing atmospheric compensation technologies to allow high power laser beams to propagate through the atmosphere. It does this by detecting the distortion the atmosphere causes to the laser beam and then instantaneously adjusting the wavefront of the laser beam so that when the beam reaches a target it is close to perfect. This is an enabling technology for the Airborne Laser program, as well as future ground-based lasers. Since the technology applies to any laser beam, it also enables ground-based space imaging systems to have resolution comparable to that of space systems. In fact this technology is now the baseline for large astronomical telescope systems. Some photographs of satellite imagery with and without atmospheric compensation that were taken from our research site at Kirtland Air Force Base, New Mexico, are on display here.

Another SAB-rated world class research area is our Information Directorate Ground Moving Target Indicator and Sensor Fusion Laboratory at Rome, New York. This unique laboratory develops, evaluates, and transitions advanced trackers, information exploitation tools, dissemination technology, multi-intelligence fusion exploitation, and advanced fusion architectures. An example of one of the lab's successful technology transitions is the Moving Target Information Exploitation system, an all-source, web-enabled information architecture. The Moving Target Information Exploitation system processes, catalogs, exploits, and disseminates information to web-based users utilizing real-time tools allowing relatively low-cost distribution of tailored Moving Target Information data. It has been demonstrated during several large-scale experiments, and has also been transitioned to two Initial Operational Capability locations at Warner-Robins Air Force Base, Georgia, and Langley Air Force Base, Virginia.

Our research in Automatic Target Recognition at Wright-Patterson Air Force Base, Ohio will allow future weapon systems to automatically identify and target specific ground targets. We are actively working to transition this technology via an Advanced Technology

Demonstration, entitled Air-to-Ground Radar Imaging, and we are developing technologies with payoffs well beyond automatic target recognition, in areas ranging from combat search and rescue to drug interdiction operations.

The Space Weather research at Hanscom Air Force Base, Massachusetts, is another world class operation. Here, we have a robust modeling capability including empirical and theoretical models that specify and forecast space weather from the Sun to the ionosphere. Recently, Air Force scientists developed the first real-time model of global electron density profiles, providing critical input for communications and global positioning systems. This model supplies information crucial to the design, operation, and simulation of a wide variety of communications, navigation, and surveillance systems. Environmental effects forecasted by this model range from intermittent outages caused by ionospheric scintillation to satellite system failures caused by intense fluxes of magnetospheric particles. The researchers at Hanscom also have developed hardware to protect our valuable space assets. This is a mass model of the Compact Environmental Anomaly Sensor that was first launched in 2000 and has mapped areas in space that are hazardous to onboard electronics.

Working closely with operational users, AFRL researchers 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. You can see some of the products of this research in the form of eye-glasses here. In addition, I have brought along a recent version of a Panoramic Night-Vision Goggle that dramatically improves the field-of-view of the user thereby enhancing their mission utility and safety of use.

NOBEL PRIZE WINNERS

The Air Force through its Basic Research Program sponsors a broad spectrum of topics at many universities throughout the United States. Approximately 60 percent of the $200+ million Air Force Basic Research program is allocated to universities through our grant process. These university investments have been highly successful for the Air Force and the entire United States. The Air Force Office of Scientific Research sponsors the work of exceptional people who provide basic research---the fundamental core component of Air Force Science and Technology. An indication of the Air Force's ability to select truly world class researchers is that we identified and sponsored the research of 38 Nobel Prize winners years *before* they won, including the work of four Nobel Laureates in 2000: Professor Alan J. Heeger of the University of California, Santa Barbara, who won a Nobel Prize in Chemistry; Professor Herbert Kroemer of the University of California, Santa Barbara, who won a Nobel Prize in Physics; Professor Paul Greengard of the Rockefeller University who won a Nobel Prize in Medicine; and Dr. Jack Kilby of Texas Instruments who also won a Nobel Prize in Physics.

EXPEDITIONARY AEROSPACE FORCE

The operations in Kosovo have served as a proving ground for many of the technologies developed by the Air Force S&T Program, especially in the area of information operations. We validated the reach-back concept, pulling forward information from continental United States-based support elements to enhance the effectiveness of our deployed fighting forces, while reducing the footprint of our combat support forces. The Air Force tested high-tech products such as Broadsword Secure Intelligence Gateway which allows intelligence analysts to access any U.S. intelligence database and the capability to make a single picture from multiple Predator images. And, for the first time, we tied key mission processes to web-based networks, making critical information instantly available to in-theater forces.

The Air Force is applying lessons learned in Kosovo to its EAF planning. We're developing and incorporating new technologies and concepts to ensure our warfighters get the right information, at the right time. To do that, "network-centric" information infrastructures will use "smart push" to make assured information available to the warfighters, while providing ensured and easy access, or "pull," of timely assured information in a user-friendly format. Our theater deployable communications systems will provide our aerospace expeditionary wings with secure and nonsecure voice, data, imagery, e-mail, and messaging - doubling the current capability of our aerospace expeditionary wings, while getting to the fight with only one-half the current airlift requirement for the same mission.

Using the latest advances in information technology developed by the Air Force Research Laboratory (AFRL), we have demonstrated several advanced planning and execution tools in our Joint Expeditionary Force Experiment. The Joint Assistant for Deployment and Execution allowed us to generate time-phased force deployment plans and tasking orders to send any combination of forces anywhere in the world, and have them arrive in the right place at the right time, and in the right sequence. This tool will allow the Air Force to complete in one hour a process that normally takes two weeks. Using a unique adaptation of the Global Air Traffic Management system, we were able to use both military and civilian air-traffic communication systems to provide continuous contact with our airlifters. Still another tool we demonstrated was the Worldwide Aeronautical Route Planner. Using multiple parameters, such as flight performance models, global weather patterns, country avoids, current navigational aids, and airway restrictions, this tool plots the most fuel and time efficient route possible in seconds versus hours.

Training is another integral part of implementing our EAF vision. The technology for Distributed Mission Training is an area that holds great promise. Using state-of-the-art simulation technology, Distributed Mission Training permits geographically-separated aircrews to jointly train in a synthetic battlespace, connected electronically from their distant air bases. Importantly, Distributed Mission Training delivers this enhanced training from the home station, which helps the Air Force limit the amount of time airmen spend deployed and facilitates the training of Air Expeditionary Forces as they prepare for deployment.

THE LEADING EDGE

There are many other Air Force technology areas that deserve special mention, but I will limit my testimony by describing just a few examples. Unmanned Combat Air Vehicles (UCAV) is an area that is seeing increasing support. The current joint major technology demonstration program with the Defense Advanced Research Projects Agency has entered its fourth year. Flight vehicle checkout and ground testing of the first demonstrator designated the X-45A is underway, with projected first flight in September of this year. The second demonstrator fabrication is complete and it was recently airlifted to the National Aeronautics and Space Administration Dryden Flight Research Center from Boeing, St. Louis, Missouri. Over 25 of the 90 demonstrations scheduled for Phase II have been accomplished. We expect completion of Phase II by the Fall of 2003.

The joint DARPA/Air Force UCAV program may well serve as a model for technology transition through detailed technology identification and maturation. Phase I of the program involved operational comparative analysis studies to assess the benefits of a UCAV system and identify the technologies, processes, and system attributes necessary for such a system to achieve those benefits. This initial phase was completed in Fiscal Year 1999. Phase II is the maturation and demonstration of these technologies, processes, and system attributes through the fabrication and demonstration of the two demonstrator vehicles and their support systems. This second phase will provide initial risk reduction activities and multi-vehicle simulation and flight demonstrations. Phase II will conclude with end-to-end demonstrations, validating the technical feasibility of a UCAV performing a Suppression of Enemy Air Defenses (SEAD) mission. A 1/48 scale model of the UCAV is on display.

To increase aircraft survivability and operational efficiencies, the Air Force is developing both manned (F-22 and Joint Strike Fighter) and unmanned (UCAV) 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 is the Small Smart Bomb. The program is divided into three phases. Phase I of the program, completed in 1997, demonstrated a six foot long, six-inch diameter, 250-pound, adverse weather, low-cost, guided weapon capable of penetrating six feet of reinforced concrete. The small guided bomb reduces the logistic footprint over existing bombs and increases multiple kills per sortie. The model shown here, Small Smart Bomb with Range Extension, builds on the success of the first phase. The Phase I Small Smart Bomb was outfitted with a fold-out wing and control tail surface kit, that expands the footprint of the munition to a 35 nautical mile downrange by 20 nautical mile off-boresight range while maintaining its six foot reinforced concrete penetration capability. The expanded footprint will simplify mission planning by allowing a single release point for multiple munitions. Phase III of the program will build upon the success of the Phase II by integrating a low-cost, laser radar seeker with automated target recognition algorithms to the small smart bomb. This program has an accuracy goal of 1.5 meters. The increase in munitions accuracy and the decreased volume of explosive will reduce the collateral damage that can occur with larger munitions..

Advances in technologies for power, electronics, micro-electro-mechanical systems, structures, and payloads are also enabling significant reductions in the size, weight, and cost of satellites. Our S&T Program will provide the technology base for 10-100 kilogram microsatellites that will offer new options in many areas of space applications. Applications previously considered not cost-effective due to size and weight limitations, such as satellite servicing or launch on demand, become possible. Clusters of formations of microsatellites cooperating to perform the job of current large satellites may ultimately allow space missions to be performed more cheaply and effectively, with higher survivability and flexibility. Here is a model of TechSat 21, a three satellite formation scheduled for launch in 2004. And here is a thin film photovoltaic array and the current technology it replaces. This array will be incorporated into the TechSat 21.

To further the miniaturization of space platforms, DARPA and the Air Force have funded ten universities to explore the military utility of innovative, low-cost nanosatellites. These nanosatellites, weighing two to ten kilograms, will perform such experiments as formation flying algorithms, differential Global Positioning System navigation, miniaturized sensors, and micropropulsion.

On July 19, 2000, the Air Force launched MightySat II.1 into orbit. At 266 pounds, MightySat II.1 is one of the most sophisticated satellites of its size ever launched. At a total S&T investment of about $40 million, this small satellite provides researchers with a "lab bench" to test emerging high-payoff technologies for space. MightySat II.1's primary payload is a Fourier Transform Hyperspectral Imager, currently the only Department of Defense (DoD) demonstrator for hyperspectral surveillance technology in orbit. Over one hundred images have been taken to date. This summer, we will launch the Warfighter-1 hyperspectral sensor on board OrbView-4, OrbImage's commercial remote sensing satellite. Warfighter-1 will allow us to continue our assessment of the utility of hyperspectral technology to perform military missions, such as detecting difficult military targets and categorizing types of terrain.

The Air Force is also conducting the Experimental Satellite System series to demonstrate increasing levels of microsatellite technology maturity. XSS-10, the first in the series, is scheduled to launch in March 2002. It will demonstrate 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 will launch XSS-11, which will demonstrate autonomous operations and provide experience with command and control in proximity operations to another space object.

Hypersonics is another area of high interest to Air Force S&T. The Air Force HyTech program achieved major successes in Fiscal Year 2001. The first-ever demonstration of a conventional jet-fueled scramjet producing predicted levels of positive thrust over the Mach 4.5 to Mach 6.5 flight range was accomplished. The engine was developed by Pratt & Whitney in collaboration with AFRL engineers, and this research was recently featured on the 26 March 2001 cover of Aviation Week. In addition, the Air Force is leading a DoD directed activity to formulate a National Hypersonics S&T Plan which has been discussed by Dr. Etter. I've brought along a 1/3 scale model of the HyTech ground engine demonstrator.

While hypersonics is at the forefront of revolutionary propulsion technology, we are continuing the development of evolutionary turbine engines. The Integrated High Performance Turbine Engine Technology (IHPTET) program is a National effort between DoD, NASA, and industry to double turbine engine thrust to weight by Fiscal Year 2003 baselined on that available in 1987. The Air Force is the DoD lead for this program. The program is highly leveraged with industry contributing approximately 50 percent of the cost. IHPTET has ambitious, rigorous goals with objectives, technical challenges, and approaches identified to meet these goals. For example, turbine blades using a double wall, "supercooling" concept enables the Joint Strike Fighter's required turbine life; and advanced intermetallic refractory alloys for turbine blade design enables engine operation at high temperature to double turbine blade life to 4000 hours. IHPTET technologies provide potential excellent return-on-investment with a 20-40 percent fuel efficiency improvement.

THANKS TO CONGRESS

I want to thank you for the strong Congressional support for Air Force S&T. Our S&T appropriations for the past two years have averaged over $275 million above our requested amount and we greatly appreciate your interest in this important program. Your support has benefited several key technologies in the areas of space and sensors.

For example, these additional funds are allowing us to better protect our Nation's space assets from both natural and man-made threats. We are furthering our fundamental understanding of ionospheric processes and improving our ability to forecast space weather phenomena. Later this year, we will launch an instrument to demonstrate the ability to detect and locate radio frequency threats to our satellites. Finally, you are helping us make strides in the important task of decreasing the cost of spacelift by reducing the cost to produce lighter weight launch vehicle shrouds, while improving their structural performance.

Last year, you also supported upgrades to the Integrated Demonstrations and Applications Laboratory at AFRL. These funds are being used to acquire and install a multispectral synthetic battlespace simulation capability that will allow simulations at dramatically reduced cost. In addition to reducing research costs, this capability provides an affordable means to evolve the 21st Century air and space sensor technologies required for next generation "system of systems" concepts. These concepts will utilize multiple sensors on both airborne platforms and space assets to successfully accomplish combat missions.

CONCLUSION

The Air Force is in the midst of a technological and organizational transformation that is radically changing aerospace contributions to the nature of war. Stealth and precision strike, in particular, have injected leap ahead improvements into combat power unlike any we have known since the introduction of the jet engine. We are making important strides in command and control, long-range power projection, and mobility in support of an integrated Expeditionary Aerospace Force.

The Air Force is fully committed to providing this nation the advanced aerospace tools and technologies required to meet America's interests around the world and ensure we remain on the cutting edge of technology, performance, military 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 technologies. I am confident that we can lead the discovery, development, and timely transition of affordable, integrated 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.