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TESTIMONY OF

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Introduction

Mr. Chairman, members of the committee, thank you for the opportunity to appear before you today to talk about the Department of Defense's (DoD) research and engineering programs in space and aeronautics and DoD's collaboration with National Aeronautics and Space Agency (NASA). In addition to discussing some specifics of DoD-NASA collaboration, it is also important to understand how the research and development (R&D) activities for space and aeronautics technologies within the Department of Defense are integrated. There are several mechanisms for coordination of R&D activities between DoD and NASA.

Space Partnership Council

Since 1997, the Space Partnership Council (SPC) has been, and continues to be, a very productive mechanism for DoD-NASA collaboration and program coordination. The SPC addresses overarching DoD-NASA requirements and issues related to space. The council is comprised of the following members:

Under Secretary of the Air Force/Director of National Reconnaissance Office

Commander of Air Force Space Command

Commander of United States Strategic Command

Director of Defense Research and Engineering

Administrator of NASA

The council meets regularly and coordinates space issues, such as technology development to enable goals like transformational space access, and operational space capabilities.

National Aerospace Initiative

Collaborative efforts between DoD and NASA over the past several years have been encompassed in the National Aerospace Initiative (NAI). NAI is a focused effort to coordinate technology development and demonstrations in three key aerospace technology areas, which are the pillars of the NAI. The three pillars are high speed and hypersonic flight; space access; and space technologies. Beginning as a concept in 2001, NAI has matured and supported development of integrated technology plans. One program that highlights the potential synergy gained between the pillars is the Responsive Access, Small Cargo, Affordable Launch (RASCAL) DARPA program. RASCAL is a program that combines a high speed air breathing first stage, with rocket-based upper stages, and a small responsive satellite to demonstrate a reusable, affordable, responsive space access system. RASCAL is a five year program to demonstrate the feasibility of coupled high speed/hypersonic flight, affordable access to space and small payload systems. Beyond RASCAL, extensive collaborations have occurred in research and development in all three areas. Through a series of workshops convened by DoD and NASA, which were followed by input from outside the government, detailed goals, objectives, technical challenges and approaches were developed.

NAI supports many important continuing programs such as the Integrated High Performance Turbine Engine Technology (IHPTET)/Versatile Affordable Advanced Turbine Engines (VAATE) projects. VAATE is a successful collaborative program that started in 1988, and involved DoD, NASA, and industry to have a long-term, focused research program to improve turbine engine technology. IHPTET is currently developing a common core to be used in the various commercial and military engines. The industry match has been an important component of the in IHPTET program. This turbine engine technology development is essential to many future government and commercial aerospace systems.

Each of the three pillars has significant activity. For high speed/hypersonic flight, the Hypersonic Flight Demonstration Program, known as HyFly, is a jointly funded program by DARPA and Office of Naval Research. The objective of HyFly is to develop and demonstrate, in flight, advanced technologies for hypersonic flight with near-term emphasis on a missile application. The HyFly hypersonic strike missile demonstrator vehicle is powered by a Dual Combustion Ramjet (DCR) engine. A DCR engine performance at Mach 6.5 was demonstrated on a full-scale model in freejet testing at NASA Langley Research Center in 2002. Its first powered flight in the atmosphere is expected in approximately one year.

Another example of an advanced prototype hypersonic missile is the Single Engine Demonstration (SED). SED will integrate the United States Air Force

Hypersonic Technology (HyTech) engine with air vehicle technologies developed by Defense Advanced Research Projects Agency. The project involves government, industry, and academic hypersonic researchers and builds on previous DoD-NASA efforts. This exciting new demonstration will be flight tested by the end of the decade. The flight vehicle will be propelled by a hydrocarbon supersonic combustion ramjet (scramjet), and should ultimately achieve a Mach 7 to 8 flight. Success of HyFly and SED could enable a new aviation flight regime, historically analogous to the revolutionary introduction of the jet engine to propeller-driven aircraft.

The second area of significant collaboration is in our access to space access pillar. A long term government/industry effort for advancing rocket propulsion is the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) program. The IHPRPT is a three phase, 15 year national program to double space/missile propulsion capability, decrease cost and increase reliability by 2010, using government-industry partnership. A key element under IHPRPT is the joint NASA-Air Force project called the Integrated Powerhead Demonstration (IPD), which should culminate in the completion of engine testing at NASA's Stennis Space Center in 2005. Four successful component demonstrations have occurred in the past 18 months. This new liquid engine cycle should enable a 25% increase in rocket engine reliability, a 200-mission life for the engine, and a reduction in maintenance time and cost. The DoD-NASA cooperation, leading to the IPD full-

flow cycle engine, should result in enhanced reusable and expendable space vehicle propulsion.

Another program which is jointly funded by DARPA and the Air Force is known as FALCON (Force Application and Launch from CONUS). FALCON is a new program to develop a Small Launch Vehicle (SLV), a Common Aero Vehicle (CAV), and a Hypersonic Cruise Vehicle (HCV). An initial goal is a rocket boosted glide vehicle capable of delivering 1,000 pounds at a distance of 3,000. Initial phases of FALCON are on-going and will demonstrate the aerodynamic properties of the flight vehicles. This program is envisioned to mature to a hypersonic glide plane capable of delivering 12,000 lbs over 9,000 miles. Thus, the FALCON program should demonstrate and validate in-flight technologies that should enable both a near-term and far-term capability to execute time-critical, prompt global reach missions while at the same time, demonstrating affordable and responsive space lift.

Space Science and Technology Strategy

The National Defense Authorization Act for Fiscal Year 2004 requires that the Secretary of Defense develop, implement and, annually review and revise a space science and technology (S&T) strategy. As the Director of Defense Research and Engineering, I am charged to jointly develop and implement this strategy with the Under Secretary of the Air Force, who is the Department of

Defense's Executive Agent for Space. The space S&T strategy is focused on short-term and long-term goals within the Department, the process of achieving these goals, and the process for assessing these goals. We are actively working with the Department's research laboratories and the Defense Advanced Research Projects Agency (DARPA), National Reconnaissance Office (NRO) and Missile Defense Agency (MDA) through a space S&T strategy team to develop and implement this strategy. This Space Science and Technology Strategy will be incorporated in the National Security Space Plan.

Conclusion

The Department of Defense and NASA research and development programs support building the technology base to enable future capabilities. Since the days of Chuck Yeager and the National Advisory Committee for Aeronautics (NACA) X-1 that broke the sound barrier, the DoD has conducted a broad range of cooperative and collaborative programs with NACA now known as NASA. Recently, the National Aerospace Initiative technology plans have provided integrated technology roadmaps, and outlined the requisite investments to enable critical military and civil capabilities. We are excited about the synergies that can be derived as we work collaboratively to achieve our common science and technology goals and transformational objectives.