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**Statement of**

**The Under Secretary of Defense for Acquisition and Technology  
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**Before the  
Subcommittee on Defense Technology, Acquisition and Industrial Base  
of the Senate Committee on Armed Services**

**on**

**The FY96 DOD Technology Base Program**

**March 14, 1995**

Mr. Chairman, Members of the Subcommittee, and staff, thank you for the opportunity to appear before you today to discuss the specifics of the Department of Defense technology base programs and how they support the Department's overall modernization plans and the war fighter's needs.

Mr. Chairman, you may have heard of the Department's studies of a "Revolution in Military Affairs" or RMA. The revolution derives not from a single innovation or idea but from a fundamental change in the way America fights. The revolution is driven by making full use of a wide range of new technology involving sensors, computers, low observables, precision guided munitions and telecommunications.

Today, I describe a vision of a second but related revolution -- a "Revolution in Military Acquisition Affairs" -- or RMA<sup>2</sup>. This revolution will change the way America develops and fields weapon systems. Like the first revolution, this second revolution is driven by capturing the synergism derived from the integration of multiple thrusts. In particular, we are making progress on three fronts: increasing our focus on life cycle cost reduction; making better use of the national industrial base; and implementing acquisition process improvements.

### **REDUCING LIFE CYCLE COST**

The first component of this revolution is the Department's increased focus on life cycle cost reduction. The Department is shifting away from a world where performance is the only consideration and towards a more balanced "cost of performance" view. I am pleased to report that weapon system life cycle cost is being treated as an independent variable, not simply as a fall-out dependent variable.

As the Department's senior acquisition executive, I chair the Defense Acquisition Board (DAB) along with Admiral Owens who wears another hat as chairman of the Joint Requirements Oversight Council (JROC). Together, we have created a strong imperative throughout the Department to do the up front trades; assess the incremental cost of driving requirements; and find the knee of the cost-performance curve(s). Our objective is to insure that the Department's modernization and recapitalization plan continues to be built on a solid foundation of timely and explicit affordability decisions.

Our attention is not focused solely on the initial acquisition cost. We are concerned with overall life cycle cost. This emphasis is driven by the fact that 60-70% of most weapon system's costs are incurred subsequent to initial deployment of the system. To the extent the Department maintains systems longer, life cycle cost becomes a more important consideration. The message here is that "back end" sustainment costs are receiving more "up front" design attention. Where it makes sense, the Department will invest in reliability upgrades to reduce the ownership costs for existing systems. For new or existing systems, the payoff associated with these life cycle cost initiatives -- in terms of savings to the Department's budget bottom line -- will not be realized over the near term, but over the long term.

The Department's Science and Technology (S&T) program supports life cycle cost reduction for new and existing systems through investments in a number of supporting technologies. Some of the Department's more prominent technology thrusts for affordability include: improved modeling and

simulation; advanced manufacturing processes; and embedded corrosion and fracture sensors. These technology investments are essential to maintain effective and capable platforms over increasingly longer service lives. The Department's projected force structure and budget requirements are related to service life assumptions supported by this S&T base.

## **LEVERAGING THE NATIONAL INDUSTRIAL BASE**

The second component of our revolution is leveraging what's happening in the commercial industrial base. The Department is placing greater reliance on commercial sources to make DOD's weapon systems more affordable. This is a two-part proposition. The first task is to leverage commercial investment in technology development -- that is the central theme of the Department's dual-use technology program. The second piece has to do with leveraging the commercial sector's capital investment in production facilities.

The Department of Defense is no longer the leader in pushing forward the investment base for many leading edge defense technologies. In aggregate terms, commercial industry surpassed the DOD in R&D spending back in 1965. The disparity between the DOD and commercial sector investment in R&D has been growing wider ever since. Commercial industry is now the technological agent of change in information systems, telecommunications and micro-electronics. The Department's dual-use technology program is tailored to leverage off the commercial technology base without having the taxpayer make the root investment.

The second piece of the equation, and here's where ARPA's Technology Reinvestment Program -- TRP -- plays a big role, is leveraging off the commercial production base. The Department is putting a great deal of emphasis on taking advantage of commercial production to manufacture defense equipment. If we can produce weapon system platforms on commercial lines, it will be more the exception than the rule. However, there is great potential for doing this at the subsystem and critical component level of assembly.

A good example is the Department's investment in an electronic packaging technique -- it is called Multi-Chip Modules or MCMs. DOD was the early leader in advancing this technology. In 1990 and 1991, there was virtually no commercial market. The Department's current projections are that the market demand for MCMs will grow to several hundred millions of dollars by the turn of the century. This growth is driven by the demand of the commercial telecommunications and computer industry. By the turn of the century, the DOD percentage of that market will drop to about ten percent of the total. As a result, the Department is able to buy off commercial MCM lines and capture savings in the prices DOD pays. I have no interest whatsoever in seeing a commercial capability developed if the DOD is not planning to buy off that commercial line to generate a net savings for the Department of Defense.

Mr. Chairman, I have been in my job now about five months. So, the TRP was not really invented on my watch. But I must say, that if it did not exist today, the TRP would be precisely the type of program I would be trying to establish to support this underlying strategy.

I am absolutely convinced that the benefits of a better leveraged industrial base are not only reduced cost, but shortened acquisition cycle times as well. The Department of Defense can not afford a 15-year acquisition cycle time when the comparable commercial turnover is every 3-4 years. The issue is not only cost. The lives of our soldiers, sailors, marines and airmen may depend upon shortened acquisition cycle times as well. In a global market, everyone, including our potential adversaries, will gain increasing access to the same commercial technology base. The military advantage goes to the nation who has the best cycle time to capture technologies that are commercially available; incorporate them in weapon systems; and get them fielded first.

## **IMPROVING THE ACQUISITION PROCESS**

The real center of gravity for the revolution is an improved acquisition process. Progress along this front makes us more efficient; enables the DOD to purchase off commercial lines; and allows us to buy more with less. In general terms, I see improvements to the acquisition process proceeding along three tracks.

**Track 1: Ground Work.** The ground work phase, now behind us, was laid by Secretary Perry, Colleen Preston, the 103rd Congress and many others. It was completed with passage of the Federal Acquisition Streamlining Act (FASA) of 1994. This act provides an excellent foundation and is especially helpful in two small-purchase categories--under \$2,500 and under \$100,000.

**Track 2: Another Round of Legislation.** The Department supports and applauds the 104th Congress' deliberations toward enactment of a second legislative package -- FASA II -- for relief from restrictive statutes not dealt with earlier. It will remove many important statutory impediments to efficient acquisition of large systems.

**Track 3: Implementation.** The Department has moved out smartly on regulatory changes to consolidate the gains made with enactment of the 1994 FASA legislation. To make the system truly responsive, we must "un-learn" some of the accumulated collective behaviors we have "learned" over the years. My immediate goal is to create a climate of reasoned, well informed risk-taking by our program executive officers and system program directors. I solicit your support to help me shift from an environment of regulation and enforcement to one of incentivized performance.

## **MODERNIZATION AND RECAPITALIZATION**

Reduced costs and shortened lead times are the principal benefits of the "Revolution in Military Acquisition Affairs." This revolution supports the Department's long term financial plan. It will determine, to a large extent, what the DOD will spend on RDT&E, procurement, operations and maintenance over the Future Years Defense Program (FYDP) and beyond.

In the short term, Secretary Perry made the conscious decision to bring our total budget and force structure down while maintaining the high state of readiness needed to support increased operational tempos. During this transient period, the focus of the Department's modernization effort has been on those force enhancements essential to meeting the demands of this strategy. Science and technology (S&T) efforts have been sustained, but overall procurement spending has been reduced to approximately 35 percent of the 1985 peak level. These actions are prudent in the near term, because past investments are adequate to sustain a force as it is being downsized.

Our current level of investment -- it is a little over \$39B in procurement and about \$34B in RDT&E in our FY96 budget submission -- will not sustain the Bottom Up Review (BUR) force over the long term. During the period of the current FY96-01 Future Years Defense Program (FYDP), the Department's investment focus must transition to a broad modernization and recapitalization effort. The objective of this effort will be to systematically upgrade and replace portions of the Department's capital stock. It is important to stress that the Department does not need to implement a one-for-one platform replacement of all current inventories. The Department's modernization and recapitalization program will be executed by:

- Injecting new technologies through service life extensions and technological insertions to modernize existing platforms, systems, and supporting infrastructure;
- Introducing new systems and concepts that substantially upgrade U.S. war fighting capabilities;
- Replacing, on a limited basis, older systems on an in-kind basis without seeking to substantially improve or upgrade a given capability.

My principal responsibility as the Under Secretary for Acquisition and Technology is to work closely with the JROC to insure the Department fields effective, technologically superior weapon systems at an affordable cost. The future readiness and effectiveness of U.S. forces will be determined by today's investment in a relevant technology base. A suitable "technology ramp" must be in place before a robust procurement program can proceed.

## **TECHNOLOGY RAMPS**

Today's leading edge systems were made possible through decades of investment in fundamental science and exploratory development work. The technology ramps initiated in the early-60's and sustained in the mid-70's gave us the stealth aircraft, precision guided munitions, and night vision systems that provided U.S. forces with a decisive combat edge during the 1991 Gulf War.

The Air Force's F-117 stealth fighter, one of the high-value strike weapons of the war, provides a good illustrative example of the need for stable, long term investment in key enabling defense technologies. The F-117 became operational in 1983 -- in ample time for the Persian Gulf conflict. However, the key enabling technologies for this system can be traced to a mathematical formulation of radar scattering geometries and the development of radar absorbing materials that date back to the early 1960's. During the 1970's, the Department's investment in 6.2 exploratory development produced new titanium alloys, better compressor seals, stealth nozzle designs and many other technologies needed for the Defense Research Projects Agency (DARPA) to build two HAVE BLUE prototypes -- the proof of concept flight demonstration vehicles for what would become the operational F-117 six years later.

To maintain the technological edge of U.S. forces, the Department must continue to establish stable and sustainable technology ramps for tomorrow's systems. The President's FY 1996 budget submission contains \$7.6 billion for the Department's 6.1/6.2/6.3 S&T programs (excludes BMDO S&T programs). Although the FY 1996 amount is about \$800 million or about 10% less than the FY 1995 appropriated level, it returns the Department's investment in S&T to a more sustainable real growth profile over the long term -- one more consistent with the historical norms established over the past 30 years. Budget authority for science and technology in FY 2001 is projected to be 18 percent higher than in FY 1996. More importantly, the FY 1996 amount is the minimum level required to initiate a series of technology "on-ramps" that provide the foundation for meeting tomorrow's joint warfighting needs.

## **TECHNOLOGY PROGRAM**

The Director of Defense Research & Engineering (DDR&E) is responsible for overseeing both the content and execution of the Defense S&T Program. Over the past year, the DDR&E developed and published the *Defense Science and Technology Strategy* and the *Defense Technology Plan* in conjunction with the Military Departments and Defense Agencies. Together, these companion documents provide a single integrated summary of the Department's overall S&T vision, strategy and program content.

In turn, each of the Military Departments and Defense Agencies organize and manage the execution of their individual S&T programs within this overarching framework. The resulting diversity in management approaches provides a robust capability and alternate methods for tackling emergent issues. All of these organizations, under the leadership of the DDR&E, work closely together to:

- establish technology "on-ramps" that are responsive to the warfighter's needs;
- review soundness of technical and programmatic approaches;
- coordinate allocation of resources;
- prevent duplication and overlap;
- execute an integrated, comprehensive program;
- guard against technological surprise.

The Department's technology "on-ramps" are a collection of individual technology programs in research categories 6.1/6.2 (basic research/exploratory development) and 6.3 (advanced development). These efforts are linked in a technology insertion road map to specific weapon system acquisition programs, either a new start or system upgrade, to satisfy the warfighter's stated mission needs. For example, the next generation of air-to-air missiles is supported by a broad range of Air Force, Army and Navy

research category 6.2 exploratory development projects to develop improved seeker, warhead, fuzing and solid rocket motor component technologies. The path for insertion of these new technologies in an improved Advanced Medium Range Air-to-Air Missile (AMRAAM) is through a research category 6.3 advanced development program, typically an Advanced Technology Demonstration (ATD), to prove the feasibility and military utility of the approach selected.

The Department has established a new mechanism in research category 6.3, called an Advanced Concept Technology Demonstration (ACTD), to rapidly transfer technology to the users. ACTDs are user-oriented, even user-dominated. An ACTD is an integrating effort to assemble and demonstrate a significant, new military capability. It is based upon mature advanced technologies -- at a scale size adequate to establish operational utility and system integrity. The demonstration is jointly implemented with the operational user and materiel development communities as key participants. ACTDs allow the warfighting user to:

- evaluate the military utility of the technology before committing to a major acquisition effort;
- develop concepts of operation for employment of the new technology;
- retain a low-cost residual operational capability.

Military needs drive the direction and resource allocation priorities of the Department's S&T program. The Joint Staff and the JROC have identified five "Future Joint Warfighting Capabilities" most needed by the U.S. Combatant Commands for coping with the post-Cold War world. These five future warfighting needs are:

- *To maintain near perfect real-time knowledge of the enemy and communicate that to all forces in near-real time.* Warfighters need to know where the enemy is, what their capabilities are, where friendly forces are, and what range of actions each could execute. In addition, warfighters need timely information and intelligence products. Specifically, they require near-real time updates on meteorological, topographical, geographical, and political conditions. The Department's S&T program is emphasizing several promising advanced technology areas to achieve dominant battlefield awareness and action cycle times. Important technological advances are being pursued in: information surveillance, information management, and intelligence dissemination. The current family of Unmanned Airborne Vehicle (UAV) ACTDs are the 6.3 portion of a "technology ramp" aimed at improved airborne surveillance and reconnaissance capabilities. Three candidate FY 1995-1996 ACTD new starts are looking at innovative ways to decrease the action cycle time of U.S. forces by addressing the growing need to process, fuse, and then disseminate intelligence: (1) Semi-Automated Imagery Intelligence (IMINT) Processing; (2) Ground-Ground and Air-Ground Combat Identification; and (3) Battlefield Awareness and Data Dissemination.
- *To engage regional forces promptly in decisive combat, on a global basis.* Prompt reaction to regional conflicts has two components: global mobility and decisive combat. Technological advances in aircraft propulsion have dramatically improved the performance of Air Force "global reach -- global power" forces. The Department's 6.2/6.3 Integrated High Performance Turbine Engine Technology (IHPTET) program, budgeted at \$134 million in FY 1996, is aimed at providing a 100% improvement (over the 1987 baseline) in the thrust/weight ratio of high performance fighter engines by 2003. Substantial strides are being made in the Department's 6.2 exploratory development programs to reduce the weight of "heavy" Army and Marine forces so they can be sea deployable in half the time with half the ships.
- *To employ a range of capabilities more suitable to actions at the lower end of the full range of military operations which allow achievement of military objectives with minimum casualties and collateral damage.* The principal challenge is to limit casualties and collateral damage. Advances in precision targeting and controlled destruction, particularly in settings where enemy combatants mingle with civilians, are required to limit collateral damage and casualties. The Marine Corps, Army and several CINCs are sponsoring a candidate FY 1995-1996 ACTD new start on Military Operations in Built-Up Areas (MOBA). This ACTD would serve as an integrating effort to

demonstrate new operational capabilities in urban settings using mature and emerging technologies from the Department's portfolio of 6.2 projects on non-lethal weapons, surveillance, sensing, target detection and situational awareness.

- *To control the use of space.* Desert Storm was the first space war. Space based systems provided coalition forces with communications, navigation, weather monitoring, threat warning, intelligence collection, and a decisive advantage in situational awareness. Technological advancements are required to insure space based communications links are jam resistant. Without assured access to and control of space, that advantage is lost. The Department has embarked on a wide range of space vehicle and booster 6.2/6.3 development efforts. The Air Force has budgeted \$30 million in FY 1996 to reduce the size and weight of the Extremely High Frequency (EHF) payload on board Milstar communications satellites. Current projections indicate that replenishment of the Milstar constellation with a considerably less costly Medium Launch Vehicle (MLV)-class Advanced EHF satellite is possible by 2006.
- *To counter the threat of weapons of mass destruction and future ballistic and cruise missiles to the CONUS and deployed forces.* Weapons of mass destruction, theater ballistic missiles, and anti-ship cruise missiles present a wide range of serious threats to U.S. forces. Technological advances are needed to allow for the better detection of and defense against biological agents. The Ballistic Missile Defense Organization has a robust ballistic missile defense technology program in place to counter validated threats. The Navy is sponsoring a "Mountain Top" ACTD to demonstrate over-the-horizon detection, tracking and engagement of cruise missiles from an elevated sensor suite. A candidate FY 1995-1996 ACTD new start on Counter Proliferation would demonstrate an improved counter force capability to survey and strike weapons of mass destruction (WMD) storage and production facilities, including the planning tools for predicting collateral damage and performing bomb damage assessments.

## **CORE CAPABILITIES**

About 70% of the Department's S&T Program is contracted out to industry and universities. The remaining 30% funds in-house research and development at the Defense laboratories and test centers. The expertise of this in-house cadre is essential to protect the core buying and planning competencies within the Department.

## **SUMMARY**

Mr. Chairman, every weapon system in the U.S. inventory today required decades of direct investment in critical enabling technologies. These systems exist because of the technologies and concepts developed by teams of dedicated researchers at our universities, defense laboratories, test centers and industrial contractors. The DOD is committed to maintaining a legacy of technological supremacy at an affordable cost.

The Department's FY96 budget submission contains a prudent and relevant mix of defense technology investments. This program is needed to produce a robust set of innovative technology options for tomorrow's weapon systems. It secures the Department's long term modernization strategy; meets the national security needs of the nation; and preserves a legacy of technological superiority for U.S. forces in the 21st Century.

I thank you for this opportunity to appear before the Subcommittee and shall be happy to answer any questions you may have.