The Department of Defense Science and Technology (S&T) Program

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Secretary of Defense William J. Perry has stated that "the challenge for the Department's science and technology program is to put the best available technology into the hands of the customer - the warfighter - in a way that is timely and cost effective both tomorrow and far into the future." While this is certainly no small task, the Department of Defense (DoD) has instituted a thorough and effective process for addressing this particular challenge.

In this post Cold War era, the primary competitor is no longer a single entity, but rather the global arms market. Today the US must maintain its military technological superiority while it also addresses broader military demands -- peacekeeping and counterproliferation and do so within reduced budgets. Technology must be applied to achieve affordability across all aspects of military systems -- acquisition, insertion, ownership, and Force levels.

There are several basic principles under which the DoD S&T program is planned and implemented. Defense guidance for building the DoD budget, based upon priorities established within the Department, is prepared and promulgated to all DoD organizations. The DoD S&T program builds upon, and complements, the respective plans and processes of the Military Services through a process of horizontal integration. The resultant "corporate" strategy for the S&T program consists of a Basic Research Plan (representing a corporate research investment), a Defense Technology Area Plan (representing a corporate technology investment), and a Joint Warfighting S&T Plan (representing joint warfighting capabilities addressed by S&T efforts). The overall goal of the S&T program is to show relevance and potential to the various customers: the acquisition force, the warfighter, Congress, and the tax-paying public.

The DoD S&T strategic planning process is responsive to both the National Security Science and Technology Council's National Security Science and Technology Strategy and the Chairman of the Joint Chiefs of Staff's Joint Vision 2010. The first of these two documents describes the President's approach to bring S&T to the service of our nation's security and global stability. It emphasizes the readiness and capabilities of our military forces, our engagement with other nations to prevent conflict from occurring, and the strength of our economy. The second document is a conceptual template that provides a common direction to assist the Military Services in developing their unique capabilities within a joint framework of doctrine and programs. By leveraging technological advances and information superiority capabilities, the traditional operational concepts of maneuver, strike, protection, and logistics can be powerfully improved to effectively become new versions of these operational concepts: dominant maneuver, precision engagement; full dimensional protection; and focused logistics.

The basic tenets of the DoD S&T Strategy include the development of superior technology in order to gain military advantage, the reduction of costs in both the acquisition and operation of DoD systems, the retention of a vibrant basic research program, and an emphasis on dual use technology and commercial practices. The strategy also includes mechanisms for more rapid transition of technology into use through Advanced Concept Technology Demonstration (ACTD) programs, and a strong emphasis on supporting "jointness" in military capabilities.

The Basic Research Plan presents objectives and an investment strategy for a competitive, multifaceted program in which DoD-sponsored basic research is performed by universities, industry, and Service laboratories. It presents the planned investment in each of 12 technical disciplines: terrestrial; cognitive & neural; atmosphere and space; mathematics; computer science; physics; chemistry; biological; materials; ocean science; mechanics; and electronics. As such, it represents a flexible, balanced portfolio that has a long-term mission orientation, that places significant emphasis on engineering, and that provides a steadfast stable commitment to key technological capabilities, such as sensors.

The Defense Technology Area Plan (DTAP) presents the applied research and advanced technology development investment strategy for the following 10 technologies critical to DoD acquisition plans and Service warfighter capabilities: air
platforms; chemical, biological defense and nuclear; information systems and technology; ground vehicles and watercraft; materials and processes; biomedical; sensors and electronics; space platforms; human systems; and weapons. It takes a horizontal perspective across the Service and Defense agency efforts, thereby charting the total DoD investment for a given technology.

The Joint Warfighting S&T Plan (JWSTP) was developed by a broad team consisting of technology and warfighting representatives from across the DoD. This document takes a joint perspective horizontally across the applied research and advanced technology development plans of the Services and Defense agencies, but for a different purpose than that of the DTAP. Its objective is to ensure that the S&T program supports priority future joint warfighting capabilities. The Joint Requirements Oversight Council (JROC) has endorsed the JWSTP planning process and methodology, as well as the 12 Joint Warfighting Capability Objectives (JWCOs) used in the development of the JWSTP: information superiority; precision force; combat identification; joint theater missile defense; military operations in urban terrain; joint readiness; joint countermine; electronic warfare; information warfare; chemical/biological agent detection; real-time logistics control; and counterproliferation.

The S&T investment is focused and guided through Defense Technology Objectives (DTOs). A DTO states what specific technology advancement is being developed and/or demonstrated, by what Fiscal year, for what specific benefit (stated quantitatively against one or two metrics solving what technical barrier), and for which customer. The benefits resulting from the technology advance includes not only increased military operational capabilities but also other significant areas such as affordability and dual-use applications. There are approximately 250 DTOs, of which approximately 180 are associated with the DTAP, and the remainder associated with the JWSTP.

A Technology Area Review and Assessment (TARA) process has been implemented as the means by which to assess the progress and numerous accomplishments within the DoD S&T program. The TARA process represents an independent review of the DoD S&T efforts by world class experts in their respective fields. Week-long reviews are conducted on an annual basis by technology area panels that consist of members from within and outside the DoD.

These teams assess the related S&T efforts against Defense Technology Objectives; Strategic Research Objectives; and other criteria such as Service-unique needs, technology opportunities, etc. Following the review and assessment of these efforts, the resultant findings and recommendations are briefed to the Director, Defense Research and Engineering and to the respective S&T officials within the Military Services and Agencies. Where requisite changes have been identified, the corresponding S&T efforts are modified accordingly.

What is key to this particular workshop is how “high assurance” technologies are being addressed within the DoD S&T program. High assurance services support the information grid (i.e., the infrastructure and services that establish a supporting information environment for the DoD). High assurance services are necessary in order to: provide high quality services to the warfighters; provide protection; eliminate/reduce vulnerabilities in the environment; ensure that information is sound and unimpaired; provide early warning of potential attacks; and provide the ability to continue operation despite having been attacked.

There are, however, current limitations to these requisite high assurance technologies. Such limitations include the following: a limited ability to support multilevel security; lack of modular “plug-and-play” components; lack of confidence regarding the availability of nonorganic assets; lack of predictive and/or anticipatory network management capabilities; lack of information warfare sensors and processors for grid self-defense; and limited ability to provide both capability and “hardness” of system assets. As a result, the current DoD S&T strategy and investment in the area of high assurance technologies includes efforts in the following: automated nodal analysis and weaponizing; anticipatory services management tools; tools for projecting and visualizing grid capabilities in terms of projected operational needs; multilevel, adaptive information security, and information warfare surveillance and defense tools.

In summary, the S&T program is critical to achieving the DoD vision for the 21st century. The DoD S&T strategic planning is responsive to the vision, and the DoD S&T investment is appropriate to meet the technological challenges. In addition, mechanisms are in place to facilitate rapid insertion of new technology. High assurance represents one of many high priority technologies that are being aggressively pursued to that end.
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Ms. Castor currently provides technical leadership, management oversight, policy guidance, and coordination for Science and Technology (S&T) programs in the Military Departments and Defense Agencies related to all areas of information technology. Accordingly, she has cognizance over the complete spectrum of technology base efforts in information technology, with an annual budget of over $1 billion, including: computers; software; communications; command and control; and intelligence/surveillance/reconnaissance.

In 1991 Ms. Castor received the Secretary of Defense Meritorious Civilian Service Award, as well as a Department of Commerce Science and Technology Fellowship, and served one year on the staff of the Science Subcommittee of the U.S. House of Representatives Committee on Science, Space, and Technology.

Ms. Castor received a Bachelor of Science in Electrical Engineering from Northeastern University, and a Master of Science in Computer Science from Boston University.