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STATEMENT BY

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RESEARCH AND TECHNOLOGY AND

CHIEF SCIENTIST

BEFORE THE

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ACTING DEPUTY ASSISTANT SECRETARY OF THE ARMY
(RESEARCH AND TECHNOLOGY)
ON ARMY SCIENCE AND TECHNOLOGY PROGRAM
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INTRODUCTION

Mr. Chairman and Members of the Subcommittee thank you for the opportunity to describe the Fiscal Year 2005 Army Science and Technology (S&T) Program and the significant role S&T is playing in support of the warfighter in our Current Force and in achieving the Army's Transformation to our Future Force Capabilities.

We want to thank the Members of this Committee for your important role in supporting our Soldiers who are now at war and for your support of today's S&T investments that will sustain the preeminence of our future Soldiers. Your continued support is vital to our success.

ARMY SCIENCE AND TECHNOLOGY

We are a Nation at War. Challenged to maintain the technological and tactical advantage over our enemies by developing and exploiting both lethal, and when possible, non-lethal means. This creates a serious challenge for the Army. Army Science and Technology (S&T) is charged to provide America's Army with sustained overmatch in land combat. To do so, the Army S&T program retains a dynamic portfolio of technology investments that is responsive to the warfighters' needs of today and the future. The Army S&T mission is to conceptualize and develop future leap-ahead technologies that are necessary to maintain a superior land combat capability unmatched anywhere in the world while exploiting opportunities to accelerate the transition of proven innovative technologies to enhance the capabilities of the Current Force. The Army's S&T program is well balanced to provide high payoff needs of the Future Force while seeking rapid transitions for critical capabilities into the Current Force.

The Army continues in its commitment to transform into a lighter more lethal force, however, we are an Army at War and are continually challenged to achieve this transformation as quickly and as efficiently as possible. As GEN Schoomaker so eloquently states, transformation is an on-going process that we must work at each and every day. The S&T investments in the FY05 President's Budget pursue technologies that can be matured and rapidly transitioned to system development and procurement to enable Future Force capabilities as soon as possible. We also fund an agile basic research program focused on enduring Army needs as well as opportunities to further transform the Army.

We are not an Army alone; we are an integral member of the Joint Warfighting Team. The S&T program is focused on developing technology relevant to the needs of the Army and the Joint Forces. It remains synchronized with operational concepts development and acquisition programs to ensure rapid transition into the field. The Army S&T program continues to exploit technology developments from the other Services, Defense Agencies and commercial industry as well as international communities to assure that our Soldiers get the very best technology as soon as possible. The Future Force Army will provide the Joint Force Commander with a versatile, full spectrum decisive land combat power while requiring significantly reduced logistics support.

S & T CONTRIBUTIONS TO THE GLOBAL WAR ON TERRORISM

Army S&T has supported the development of technology that has produced several benefits for the Soldier in Iraq and Afghanistan. Perhaps the most important contribution that the S&T community continues to make is sending in-house scientists and engineers with the expertise and experience in critical technologies into the theater to see the real-life conditions, assess the problems, and develop rapidly deployable solutions for the warfighter. This community is committed to getting effective and usable technology into the hands of the warfighter --saving lives and enabling successful missions. While you have heard many examples of technology that have

come out of S&T in support of the current operations, such as the Interceptor Body Armor, the HMWWV Expedient Armor kits and the Stryker "Bar Armor" in previous testimony, I want to take the time to highlight a few contributions that often aren't reported but are clearly contributing to our continued success. These are examples of technologies that play an important role in getting the job done. One example is the Chitosin bandage. It is an FDA-approved bandage designed by the Medical Research and Materiel Command to stop severe arterial bleeding within 2-4 minutes of application. This bandage's adhesive nature and enhanced clotting capability provide wound pressure and bleeding control to external hemorrhages. This bandage has been deployed to both SOF and conventional forces in theater and has been utilized successfully on a variety of injuries ranging from gunshot wounds to landmine injuries. Bottom-line… it saves lives.

Another example is the Forward Area Language Converter (FALCon), an Optical Character Recognition and machine translation system on a portable computer for foreign languages in theater. It was designed and developed by the Army Research Laboratory and provided to the Intelligence Community as a quick and reliable way to translate and analyze captured documents. FALCon can translate up to 47 languages including Arabic and Asian languages and is being used in both Iraq and South West Asia.

Finally, the Army deployed a prototype directed energy system to Afghanistan consisting of a commercial kilowatt class laser mounted on a HMMWV developed by the Space and Missile Defense Command. This system was successfully used in neutralizing surface mines and Unexploded Ordnance.

FUTURE COMBAT SYSTEMS (FCS)

Supporting FCS remains the highest priority for Army S&T. We have about 1/3 of our budget ($600M) invested in technologies that will provide our ground combat forces of this decade and the next with the dominant, full-spectrum combat power they will need to carry out their missions swiftly, efficiently, decisively and as safely as

possible, no matter where they are asked to fight. FCS will be a multi-functional, multi-mission, reconfigurable system of systems designed to maximize Joint Interoperability, strategic and tactical transportability, and commonality of mission roles, including direct and indirect fire, reconnaissance, troop transport, countermobility, non-lethal effects and secure, reliable communications. In May 2003 the FCS Program passed Acquisition Milestone B, transitioning from S&T into System Development and Demonstration. The Project Manager for FCS continues to use the Boeing-led Lead Systems Integrator team to identify and integrate technologies from the Army, DARPA, other Service and industry programs to develop an FCS that will satisfy the capabilities described in the approved Operational Requirements Document.

FCS has adopted an Evolutionary Acquisition Strategy, which will allow the Army to increase the capabilities of the system of systems over time through spiral and incremental development processes. The initial instantiation of FCS (Increment 1) will be designed to provide certain "threshold" capabilities. The subsequent versions will deliver increased functionality to achieve "objective" capabilities as quickly as possible. Army S&T continues to play an important role in the FCS program by providing specific critical technology solutions for Increment 1. As part of the Milestone B decision, the PM FCS identified 31 Critical Technology (CT) areas that needed to be addressed. The technology solutions to address most of these areas come from the Army S&T community in collaboration with DARPA. Eighteen S&T programs that were not quite as mature as desired by the May 2003 decision to enter SDD were identified in the PM FCS risk mitigation plans as being essential for Increment 1. Army S&T is committed to the continued maturation and demonstration of these technologies for delivery to the LSI prior to the FCS Preliminary Design Review in 2005. Some examples are: 120mm Line of Sight/Beyond Line of Sight Cannon, Mid-Range Munition, Robotic Follower and Semi-Autonomous Robotics for the Soldier "Mule", Active Protection against Kinetic Energy weapons, and Tactical Wireless Network Assurance algorithms.

We continue to mature and demonstrate these critical enabling technologies, providing the promised products on schedule for integration into FCS. Instead of

"throwing technologies over the transom" to the PM for extensive additional development, we are entering into Technology Transition Agreements (TTAs) with the PM and LSI to ensure that S&T will deliver these products within the timeframe they need for integration into the system of systems. I believe that the implementation of the TTA approach will be a very valuable by-product of the FCS experience - a management tool that will help us bridge the gap that often exists between the end of an S&T program and the actual transition of the technology to an Acquisition program.

In addition to the efforts supporting Increment 1, S&T now has moved our main emphasis to developing capability-enhancing technologies for the Increment 1 Spirals and for Increment 2. Dr Tether and I have agreed to continue the Army/DARPA FCS Partnership for FY 2004 through 2007. We have identified a set of focus areas that represent some of the greatest challenges for the FCS and Future Ground Combat, namely: Networked Battle Command On The Move, Autonomy With Intent, Find the Enemy, and Affordable Combat ID. We have agreed to co-fund about 15 high risk-high payoff programs at DARPA to find technology solutions that, when spiraled into FCS, will provide the next leap ahead in capabilities.

FUTURE FORCE WARRIOR

Another major S&T investment is the Future Force Warrior (FFW). FFW will provide capabilities to the individual soldier that are achievable only at the platform-level today. Through networked connectivity to the FCS-equipped maneuver Unit of Action (UoA), FFW will enable revolutionary lethality, mobility, survivability, and sustainability for the individual soldier while reducing logistics demands. By the end of 2007, the FFW program will demonstrate increased individual soldier lethality and survivability through netted communications and fires while reducing the soldier's physical, fighting load from over 90 lbs to less than 50 lbs. The program develops a lightweight, low-observable, enhanced-armor protective fighting ensemble that includes lightweight, high-efficiency power sources; embedded physiological monitoring and limited medical treatments; embedded training; and networked sensors to enable unparalleled

situational understanding.

BASIC RESEARCH

The Army's basic research program produces new knowledge to fuel revolutionary advances and leap-ahead technology that enable Army Transformation. The program invests in world-class expertise (government, academic and industry) and state-of-the-art equipment. It balances its investment between in-house Army specific research and leveraging external scientific research that can be used for Military applications. For example, few people would have anticipated that the basic research investment in atomic clocks in the late 50s would have resulted in the GPS that is so prevalent today.

Army In-house basic research focuses on military-unique problems, providing the underlying understanding that will enable technology development for the Current Force and Future Force technologies such as novel penetrators, lightweight durable armor, and energetic materials. In-house exploration research helps maintain "smart buyer" capabilities essential to the Army; utilizes Army unique facilities; and supports researchers in areas critical to the Army

The Army maintains an extramural basic research program that is balanced between its two major components:(1) the single investigator program that invests in the brightest minds at our leading universities and is a key source of next-generation of scientists and engineers with an understanding of military problems; and (2) larger scale partnerships with universities and industry to take advantage of commercial investments and the cutting edge research at outstanding universities in areas critical to the Future Force. The external basic research program gives leverage to the power of academia and industry; focuses world-class research on Army challenges; allows flexibility to capture new discoveries; and, complements internal efforts. The Army continues to exploit the opportunities created by these organizations to accelerate development of

Transformational capabilities to a lighter, smarter, faster force.

The Institute for Creative Technologies (ICT) at the University of Southern CA continues to be an excellent example of how these Centers attack Army problems with new and different views. ICT leverages academic and Hollywood expertise to perform fundamental research in simulation environments and virtual human depiction for training, mission planning and rehearsal. It has worked with the Training and Doctrine Command's (TRADOC), Infantry School at Fort Benning to develop cognitive leadership training aids that leverage both Microsoft's X-Box game console (Full Spectrum Warrior) and "gamer" PC's (Full Spectrum Commander). In fact, Full Spectrum Commander is currently being adapted for Afghan National Army training in Operation Enduring Freedom.

The Institute for Soldier Nanotechnologies (ISN) at the Massachusetts Institute of Technology focuses and adapts nanotechnology research to significantly enhance soldier survivability. Investment areas are nanofibers for lighter materials, active/reactive ballistic protection (to solve the energy dissipation problem), microclimate conditioning, signature management, biomonitoring/ triage and active control components.

Last month we opened the Institute for Collaborative Biotechnologies (ICB) at the University of California, Santa Barbara. The ICB integrates biosciences with the physical and engineering sciences to provide an understanding of the biological construction of novel materials such as biologically-derived, functional electronic, magnetic and optical materials; integrated multi-modality sensing; biologically-derived network concepts; and, sense and respond actuation capabilities. This will influence the development of technology that improves military capabilities in the areas of precision strike, signature management, network design and implementation and "identification of friend or foe."

Collaborative Technology Alliances are Industry-led partnerships between Industry, major universities, HBCU/MI, and government. The strategy takes advantage of the large industry investments in areas of high importance to the Army such as communications and networks; robotics; advanced sensors and decisions architectures; and power and energy. This collaboration combines the practicality of industry with the creative research capabilities of universities and the operational knowledge and warfighter expertise of Army laboratories to leverage state of the art technology for the soldier.

Centers of Excellence support the advancement of technologies directly related to the enduring needs of the Army by funding universities where state-of-the-art research programs are coupled with broad-based graduate education programs to increase the supply of scientists and engineers in the areas of interest. This strategy focuses critical mass of effort on enduring challenges.

MANUFACTURING TECHNOLOGY (MANTECH)

The Army ManTech Program is designed to improve readiness and reduce total ownership cost of Army systems through the implementation of new and enhanced manufacturing technologies. In 2002, the Army focused its MANTECH efforts to address high priority projects that will enable affordable production and sustainment of the Future Combat Systems (FCS) and Future Force in four major investment areas: Armor; Electronics/Power Systems; Munitions; and Sensors. The Army ManTech Program places a strong emphasis on transitioning technology, directly involving the technology developers, acquisition program managers and industry.

The Army's newest Center of Excellence, the Flexible Display Center, was established on 10 February at Arizona State University at Tempe (ASU). ASU will partner with industry, other universities, and the government to advance flexible display technology and manufacturing. The Army's goal is to have rugged, low-power flexible displays provide enhanced information and situational awareness for the Soldier and

vehicle platforms. The FDC will provide the innovative research and development for materials, devices, and manufacturing processes to solve critical challenges in the performance and fabrication of flexible displays. The pay-off to the Army is a Transformational capability for a lighter, smarter, faster Future Force.

A good example of the return on investment that the Army ManTech program has achieved is the Enhanced Manufacturing Processes for Body Armor Materials project that ended in May 2001. This effort helped reduce the cost of the composite plates that go into the Interceptor Body Armor vest from $850/plate to $500/plate. Through December 2003, 500,000 plates have been produced for the Army and the Marine Corps. For a total shared investment in the ManTech program of $1.5M, we have realized a total of $175M in cost avoidance. With the Army's plan to field Interceptor Body Armor to all of its deployed forces, we expect this cost savings to significantly multiply.

CONCLUSION

The Army must maintain a diverse S&T portfolio to be responsive to current and future warfighter needs. The S&T community seeks technological solutions that can be demonstrated in the near-term, investigates the feasibility of new concepts for the midterm, and explores the imaginable for the uncertain, far-term future. In closing I would like to thank you, Mr. Chairman, for the opportunity to testify before the Subcommittee. I would be happy to answer any questions you or the Members of the Subcommittee may have.