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STATEMENT TESTIMONY OF

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BEFORE THE UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON ARMED SERVICES

SUBCOMMITTEE ON TERRORISM, UNCONVENTIONAL THREATS

AND CAPABILITIES

March 29, 2006

Mr. Chairman, distinguished members of the Subcommittee, thank you for this opportunity to appear before you to discuss the Department's FY 2007 science and technology (S&T) program. This is my first opportunity to appear before Congress as the Director of Defense Research and Engineering (DDR&E). I would like to use this opportunity to describe the Department of Defense S&T program *and* to focus on some of the priorities I believe the Department's S&T and research and engineering (R&E) program should address. I have outlined a vision for the Defense Department's R&E program - "Develop Technology to Defeat Any Adversary on Any Battlefield." I interpret this vision in the broadest possible sense, from defeating today's terrorist threat at virtually any global location to ensuring superiority against any nation state adversary to ensuring that our defense technology base has the talent and tools to ensure future U.S. superiority in defense technology and products.

The current S&T program is influenced by the ongoing Long War. On September 20, 2001, President Bush stated "This war will not be like the war against Iraq a decade ago, with a decisive liberation of territory and a swift conclusion. It will not look like the air war above Kosovo…Our response involves far more than instant retaliation and isolation strikes. Americans should not expect one battle, but a lengthy campaign, unlike any other we have ever seen. It may include dramatic strikes, visible on TV, and covert operations, secret even in success. We will starve terrorists of funding, turn them one against another, drive them from place to place, until there is no refuge and no rest." This was an insightful statement. Since 2001 the United States has been continuously at war – "fighting the Long War."

The 2006 Quadrennial Defense Review recognizes that we are in the fourth year of the Long War, a war that is unlike wars we have fought in the past. This new war is irregular in its nature, with insurgent terrorist extremist groups presenting a new and difficult threat. The challenge of an irregular war means that the uniformed men and women of our nation need new and different capabilities to address the emergent threat. The Department's research and engineering program continues to shift focus to fight this Long War by changing the overall investment portfolio for S&T to develop new and different capabilities, and to continue to expand efforts to prototype and transition technology. However, the Department must also remain vigilant in addressing potential nation state adversaries.

Coupled with the shift in investment, it is clear we should also review our business practices to ensure they provide greater agility and flexibility in developing, maturing, and transitioning technology to operational use. I am asking members of the DoD R&E team to be open-minded and active in seeking new technologies which can be applied to delivery of defense capability. The Congress has been very helpful in providing funds for Combating Terrorism Task Force and Quick Reaction Special Projects, funds which allow us to act with great urgency in identifying solutions to emergent operational issues or to quickly apply a new technology to our military needs. Moving toward the future, funding flexibility and responsive business practices will be essential for the Department as we try to outpace an adversary who lives by no requirement, budget or procurement rules.

While the challenges of the present create a situation where the investment portfolio and business processes are addressing current challenges, the Department still needs to address future needs for the force after next. Thus, the overall S&T program requires a careful balance of emphasis between the near- and far-term. For the near- term, the Department S&T program will work to identify and

accelerate transition of technologies that can provide improved capabilities for our deployed forces. The far-term is addressed, in part, by striving to ensure there is a sufficient flow of new ideas from a mix of an experienced workforce side-by-side with a fresh cadre of scientists and engineers working together to address the national security challenges of the future, and by pushing the Department to continue to reach out aggressively to universities, other government laboratories and to industry to leverage the best total technical capabilities of our nation.

Before discussing specific highlights of the S&T program, I would like to provide a top level overview of the Fiscal Year 2007 President's Budget Request for S&T.

FY 2007 DoD President's Budget Request for Science and Technology

As evidenced by the President's Budget Request, the Department continues to place high priority on S&T as the foundation of our ability to maintain a technological edge over our adversaries. The 2006 Quadrennial Defense Review (QDR) challenged the DoD S&T program to be more agile in a time of war, prepare for wider asymmetric challenges, and to hedge against uncertainty over the next 20 years. The QDR codified the path the Department's S&T program had already begun several years ago.

Technologies such as stealth, precise global positioning, low light vision devices, precision guided munitions, unmanned vehicles, and more capable information management systems are the combat proven results of the Department's long-term investment in S&T. The United States current conventional capabilities are superior to other conventional militaries and result, in part, from the technological advantages embodied in our systems. Our armed forces enjoy a capability advantage today, due in part to a legacy of decades of

investment in S&T. Maintaining this capability edge is critical as technology increasingly becomes available on the world market. Potential adversaries will draw upon the technology market-place to improve their capabilities, and these adversaries will often do so with speed and agility, unencumbered by budget procedures, procurement rules, and requirements processes. In addition, the insurgency operations of the Long War require new types of capabilities to allow our forces to operate more effectively against an elusive and agile adversary.

Amid significant budgetary constraints, the Department demonstrated its commitment to S&T with an FY2007 budget request of $11.1 billion. This represents an increase of three percent, in real terms, over last year's President's budget request. Put in another perspective, the Department's S&T investment has grown over 23 percent above inflation – or almost $2.5 billion - over the past six years. In fact, the FY2007 S&T budget represents the largest request, in constant dollars, since the initiation of the current budget structure in 1962.

I would acknowledge that the FY 07 request is below the FY 06 appropriated level of $13.5 billion. However, in addition to reductions, the FY 06 budget approved by Congress included a record increase of $3.1 billion over the FY 06 request for a large number of discrete, directed projects. The pace of increase and activity in this area is taxing the Department's management and oversight capability. More importantly, we would like to work with the Congress to ensure that future adjustments consider both the Department's urgent needs for the Long War as well as the extraordinary value the nation has achieved through using competition and peer review processes to get the maximum value for every tax dollar.

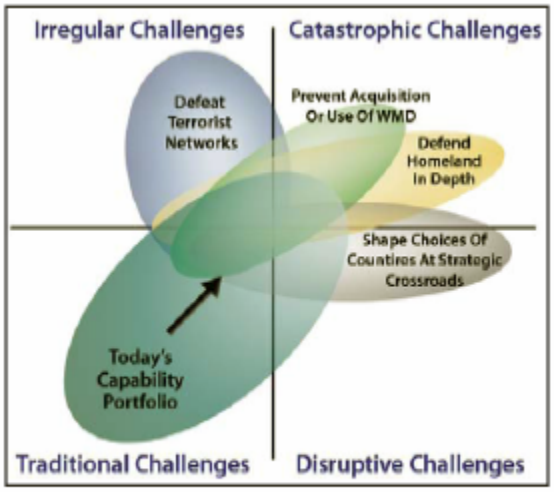
The table below shows the overall change in the President's Budget Request between FY2006 and FY2007 for S&T and R&E. There are several notable items in the macro-scale budget request. First, the request for Basic Research, that component of the budget that develops the technologies for the force after next, shows an increase of over $100M. This is significant because Basic Research had shown little growth over the past several years. It is exactly this Basic Research request that provides the fuel for new ideas and the incentive for creation of new scientists and engineers – young people should respond if they see an exciting and viable career path. A second notable point is that the combination of basic and applied research—those elements of the budget that create new scientific knowledge, make up nearly all of the FY2007 S&T increase—the Department's Budget Request demonstrates a renewed commitment to the long-term future.

Comparison of DoD Research and Engineering Requests
(President's Budget in $ Millions – Budget Authority)

	FY 2006 Request	FY 2007 Request
Basic Research	1,319	1,422
Applied Research	4,139	4,478
Advanced Technology Development	5,064	5,183
Total DoD Science and Technology	**10,522**	**11,083**
Advanced Component Development and Prototypes	14,143	15,387
Total DoD Research and Engineering	**24,665**	**26,470**

While the FY2007 DoD S&T Program reflects a renewed emphasis on the long-term, it is also a robust program that continues to explore new applications of existing technology for current military operations and the Global War on Terrorism (GWOT), as evidenced by the growth in Advanced Technology Development and Prototyping.

The S&T budget request supports the on-going transformation of our military by migrating funding from "traditional" technologies to address these new security challenges. The figure below is taken directly from the 2006 Quadrennial Defense Review and provides a snapshot of the philosophy used to shape our technology program.



As the diagram shows, the Department is shifting its portfolio of capabilities to address irregular, catastrophic and disruptive challenges while sustaining capabilities to address traditional challenges.

Within the overall S&T program, the Department continues to reshape the investment portfolio to focus on developing technologies to support transformational capabilities and to combat terrorism. Significant areas of growth and emphasis for the S&T program are:

- Medical biodefense efforts to improve force protection. Up roughly $150M from the FY2006 request.
- Technologies to detect and neutralize improvised explosive devices (IEDs), mines, rockets and mortars. Growth is seen in the Rapid Reaction Fund of the Quick Reaction Special Projects program element and the Combating Terrorism Technology Support program, to name just a few.

- Secure, mobile networking technologies and surveillance systems to enable high-tempo operations in any environment.
- Directed energy technology to continue the development of speed-of-light weapons.
- Power and energy technologies to address the demand for energy and batteries required to support the individual warfighter.

The FY2007 S&T Program begins to shift funding away from traditional technologies to better address asymmetric threats like terrorism and counter-insurgency and defend against weapons of mass destruction (WMD). A renewed focus of our program is on "disruptive technologies" – breakthrough technologies like integrated sensors, directed energy, non-lethal weapons, cyber war defense, ultra miniaturization, space capabilities, and other technologies that could change the way we fight over coming generations.

Terrorist Threat Focus Areas

I would like to outline key areas where the Department will seek to emphasize and coordinate five efforts to develop specific technologies.

1. Counter Terrorism: The rise of global non-state terrorist networks is one of the defining characteristics of the last decade. The defeat of terrorist networks has a technology aspect and requires the Department to expand efforts in areas such as persistent surveillance to find and precisely target enemy capabilities in denied areas; capabilities to locate, tag, and track terrorists in all domains; language translation and cultural awareness technologies to allow our young men and women to operate with greater assuredness in unfamiliar cultures; and non-lethal capabilities. The Department has stepped up efforts in each of these areas over the past several years. Within the last year, the Department of

Defense has actively engaged in developing a detailed technology roadmap to more effectively locate, tag and track terrorists. This effort will provide a framework for the Department to guide its investment strategy to defeat the terrorist networks and also provides insight into which technology efforts should be developed in the near-, mid- and far-term. The QDR specifically highlighted the need to improve the Department's language translation capabilities. This is a broad area that can be addressed from both a technology and operational perspective. Within the technology sphere, we have been actively developing language translation capabilities over the past several years. As an example, the Language and Speech Exploitation Resources (LASER) was successfully deployed to Iraq in the past year. The LASER provides phrase-based machine translation of spoken text in several relevant languages. This year, we enhanced this capability with a written text-to-text translation capability known as "Five Document Exploitation Suite." We continue to explore new opportunities in language translation technologies.

2. Urban Operations: As seen in Operations Enduring Freedom and Iraqi Freedom, military operations in an urban environment require different capabilities and technologies than are needed in "traditional" warfare. The highly cluttered urban environment adds to the "fog of war" through enhanced defensive positions, places for an adversary to hide and escape, and the confusion of sorting combatants from non-combatants. The S&T program is currently working on, and needs to continue to focus efforts to provide persistent surveillance in an urban environment, sensors that "see through walls", autonomous vehicles, and non-lethal technologies, to name only a few. We also continue efforts to rapidly map complex urban terrain at high resolutions, and to use these products in expanded simulation and experimentation. Our young men and women require much greater situational awareness, and we must provide them options between a bull-horn and a bullet.

We want to reliably send robots as advanced scouts into contested zones, or areas where our troops are at most risk. Over the past year, we have taken significant strides toward this priority, but more needs to be done.

3. Weapons of Mass Destruction (WMD): This area continues to be of great importance in the Long War. The Department is bringing new technology to bear on the challenges of detecting and tracking fissile materials, detecting and identifying the presence of chemical and biological agents, and developing countermeasures to chemical and biological agents. The extreme consequences of these threats, and the difficult technical challenges posed by these threats, will dictate an increased investment of S&T resources in a full spectrum of technology-driven responses.

4. Information and Network Technologies: The Department will need to continue its emphasis on investments in the full spectrum of technologies in this area. A wide range of tools and technologies are now available which can sift through very large amounts of data and provide analytical information about the content. Robust networks will be required by DoD to share information derived from various sources and enable the fusion and analysis of large amounts of information in an effort to identify small hints of terrorist activity. At another end of the spectrum, these networking technologies must be used by deployed forces to ensure they share a common picture of the operating environment and to enable the full capability of our forces through the effective networking of our people, sensors, and weapons.

5. Manufacturing Technology (ManTech): Manufacturing Technology is an important enabler of our efforts to lower cost and quickly move disruptive technologies into fielded disruptive capabilities. ManTech is advancing affordable 3rd Generation IR technology that enables our soldiers to detect the

enemy from greater distances with increased resolution, a 20% weight reduction at 1/3 the cost of the current systems. Unmanned ISR vehicles will have increased intelligence and endurance capabilities from manufacturing advancements in Silicon Germanium systems that replace heavy, bulky radios with new Integrated Radio-On-Chip systems. New low cost silicon doping processes and packaging of high voltage devices will provide the pivotal light activated semiconductor technology for directed energy and high power electronic protective systems, providing revolutionary lethality and survivability for future forces. Soldiers will use power efficient body worn display systems, a result of manufacturing advancements in flexible displays. Our vehicles and soldiers will have increased protective capability from manufacturing improvements in composite armor.

Technology Delivered to Today's Warfighter

Some notable successes from the S&T community clearly demonstrate a robust program that is agile and flexible to address a wide range of asymmetric challenges. I will only highlight a few representative demonstrations from the Combating Terrorism Technology Task Force (CTTTF), Advanced Concepts Technology Demonstration Program (ACTD) and other programs within the DDR&E portfolio.

CTTTF**.** The Combating Terrorism Technology Task Force initial objective was to focus Department technologies on counter terrorism issues. As we have more clearly defined the Long War threat, the task force has focused its objectives into several key areas such as leveraging the DoD S&T base and those of other Federal Departments, stimulating interagency coordination, anticipating adversaries' exploitation of available technologies, exploiting commercially available technologies and accelerating fielding of new capabilities. While most

aspects of CTTTF programs are classified, previous areas of focus have included wide area surveillance and tracking; standoff detection of explosives; special communications capabilities; counter IED applications; and counter weapons of mass destruction capabilities. Additionally, the CTTTF developed and maintains the Joint Experimental Range Complex at Yuma Proving Ground. While many are familiar with the Counter-IED testing done at Yuma, the site is increasingly used to evaluate new counter-terrorism and counter-insurgency technologies from DoD laboratories, other government agencies, and industry.

Joint Explosive Ordnance Disposal (JEOD) ACTD. The JEOD has delivered capabilities that are saving lives in Operations Iraqi Freedom and Enduring Freedom. Some successful operational products from this ACTD include a Joint Service EOD Technical Support Center (TSC) providing operators with 24/7 reach-back to subject matter experts; a domain network providing the backbone architecture for EOD information collection, storage, and retrieval; an incident reporting tool for data collection; a data repository, and satellite communication equipment enabling far forward operators real-time access to TSC and subject matter experts.

Counter Bomb/Counter Bomber ACTD. This ACTD underwent its second of four planned spiral deployments recently at the U.S. Naval Station, Rota, Spain. This ACTD is designed to provide technologies, techniques, coupled sensors with information systems to provide greater standoff detection of potential bombs and bombers.

HUMINT and Counter-Intelligence Support Tools ACTD. This biometrics automated toolset (BAT) provides the capability to match latent fingerprints recovered from Improved Explosive Devices (IED) to detainee's fingerprints. Because of BAT, 18,000 fingerprints have led to 36 arrests of bombing suspects.

Buffalo Mine Clearing Vehicle. Our Foreign Comparative Testing program brought us the South-African developed Buffalo mine clearing vehicle that is currently probing and clearing mines and IEDs. The vehicle provides 360-degree protection for its occupants that can withstand a triple-stacked land mine or 45 lbs of TNT, on any wheel, and a double-stacked land mine, or 30 lbs of TNT, anywhere under the vehicle. It is equipped with a mechanical arm that vehicle occupants use to pick up and move mines. One vehicle configuration can run at high speed down a road and push IEDs out of the way of ground forces.

Long Term Picture

We must continue to be vigilant about all aspects of the longer term needs of the Department. Thus, the FY 07 increase in Basic Research and Advanced Research funding is very important to cultivating ideas and technologies which will become the next tools for response to moves by terrorist and nation states.

Additionally, we will need the best and brightest minds of the nations to help the Department tackle these challenges. This year, the Department doubled its planned investment in National Defense Education Program (NDEP) – we look forward to employing the first graduates of the NDEP over the coming years. While expanding the core NDEP effort to provide scholarships and fellowships to United States citizens in defense critical skills and disciplines, we are also adding an initiative to promote RDT&E and defense awareness at the pre-college level and to expand the use of internship programs to attract and hire young scientist and engineers.

Conclusion

The robust base created by the nation's past investment in S&T programs has paid significant dividends as the Department encounters difficult challenges

presented by today's terrorist threat. The DoD is recognizing this success by growing its investment in the fundamental technologies which can lead to the future solutions necessary to counter the threats posed by evolving terrorist and nation state adversaries. The DoD R&E team will continue to work with urgency to move new and available technology into the hands of warfighter's to address their emergent needs being driven by a very agile and creative adversary. Finally, we are taking steps to improve our processes in an effort to ensure coordination and collaboration across our S&T portfolio in order to deliver maximum results for the taxpayer. These and other actions will ensure the nation is prepared to defeat any adversary on any current and future battlefield.