

**NOT FOR PUBLICATION
UNTIL RELEASED BY
THE SUBCOMMITTEE
ON EMERGING THREATS
THE SENATE ARMED
SERVICES COMMITTEE**

**STATEMENT
OF
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COMMANDING GENERAL
MARINE CORPS WARFIGHTING LABORATORY
BEFORE THE
SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES
OF THE
SENATE ARMED SERVICES COMMITTEE
CONCERNING
SCIENCE AND TECHNOLOGY
ON
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Introduction:

Chairman Roberts, Senator Reed, distinguished members of the committee; it is my privilege to serve as the Commanding General of the Marine Corps Warfighting Laboratory at the Marine Corps Combat Development Center and as the Vice Chief of Naval Research at the Office of Naval Research. Thank you for the opportunity to share my views on the important issues associated with Naval Science and Technology as they impact the Global War on Terrorism and the Marine Corps operational abilities to successfully wage that war. I would like to address the contribution of Naval Science and Technology based upon my experience as an operational commander and from what I have observed and learned since recently assuming a leadership role in Naval Science and Technology. To put my thoughts in context, I would like to lay out how Science and Technology supported the warfighter prior to the Global War on Terrorism, and then discuss how I saw this support adapt from the period of Operation Enduring Freedom in Afghanistan to Operations Iraqi Freedom, and since that period how I see Naval Science and Technology supporting the warfighter today and into the future.

Pre Global War on Terrorism:

Prior to the Global War on Terror, Naval Science and Technology worked diligently and productively on delivering technologies to the operational forces through the well constructed research and development process, gleaning technology opportunities through basic research, discovery and innovation, and exploitation and deployment into formal programs of record within the systems commands. The requirements process was generated through universal needs

statements articulated periodically by the operational forces and vetted through a concept based requirements system. Both the Navy and Marine Corps conducted aggressive concept based experimentation in partnership with the operational forces. The identification of operational requirements and the servicing of these through the combat development process worked well, but were often protracted. The tendency was to respond to requirements of the operational forces using a requirements pull methodology. This approach was probably appropriate for supporting the deliberate development and fielding of future warfighting capabilities. As was soon seen, however, this approach was not particularly responsive to the emergent needs of the men and women who would be asked to fight the Global War on Terrorism.

Post-Global War on Terrorism:

Business as usual changed rapidly and permanently as a result of 9/11 and the initiation of the Global War on Terror. While Science and Technology clearly still needed to conduct basic research, which could identify cutting edge technologies for the future warfighter, it was also recognized that Science and Technology needed to focus attention on today's warfighters engaged in current operations. To adapt, the Science and Technology community has had to take its traditional approach to technology push and requirements pull and make them equally capable of timely and responsive support as well as deliberate support.

The Global War on Terrorism presented the Science and Technology community with new challenges; but more importantly the Global War on Terrorism has given the Naval Science and Technology community the opportunity to be even more relevant to the warfighter. I think it

would be useful for us to briefly look at Science and Technology involvement in our two most recent operations: Operation Enduring Freedom and Operations Iraqi Freedom.

Operation Enduring Freedom:

From my perspective Operation Enduring Freedom was a come as you are operation. As the Commanding Officer of the 15th Marine Expeditionary Unit, forward deployed to the Northern Arabian Sea after the attack of 9/11, this Marine unit was the initial conventional force on the ground in Afghanistan. As such, there was little opportunity for us to identify Science and Technology needs or for emerging Science and Technology to be pushed. What Operation Enduring Freedom did provide was a tremendous number of needs that could be supported by emerging Science and Technology. Operation Enduring Freedom clearly laid out to the Science and Technology community critical needs such as aircraft electronic countermeasures, effective dust palliatives to mitigate unsafe dust levels in austere operating environments, more pervasive Intelligence, Surveillance and Reconnaissance at the tactical level, as well as reliable over the horizon and on the move communications. For the Science and Technology community, Operation Enduring Freedom served as a real world laboratory for what it takes to fight on extended and dispersed locations in support of the Global War on Terrorism and battlefields of the future. Additionally, Operation Enduring Freedom underscored the need for a streamlined processes for the Science and Technology provider as well as the combat developer to fast track the needed capabilities to the warfighter.

Operation Iraqi Freedom:

Based upon my experiences in Operation Iraqi Freedom working with the British Royal Marines, and as part of I Marine Expeditionary Force (I MEF), again as the commander of the 15th MEU, I believe there was a real sea change in the manner in which Naval Science and Technology was approached. What I observed in Operation Iraqi Freedom, and what I have learned since assuming my current position, validates that Science and Technology support is making a credible shift from the traditional approach of delivering capability to the warfighter through experimentation and formal programs of record to one that also accommodates a more proactive and responsive methodology. Operators, combat developers and technologists are now working more closely in Science and Technology working groups, focusing on the delivery of viable cutting edge technologies to the warfighter.

To illustrate how the Science and Technology community has responded to the challenges of the Global War on Terrorism, I have selected a few examples of successful efforts resulting in the rapid fielding of advanced capabilities provided to the operating forces as a result of warfighting requirements that leveraged technology.

The Marine Corps' Dragon Eye Unmanned Aerial Vehicle is a great example of how "technology push" can work. Originally conceived of as part of an effort by Office of Naval Research and Marine Corps Warfighting Lab to enhance small unit organic surveillance, the Dragon Eye combines advanced technologies in hand held computer devices, batteries, electric motors, wireless data communications, and optics. This combination has yielded a man-portable, easy to use Unmanned Aerial Vehicle that can move with combat forces and provide overhead imagery directly to a battalion or smaller sized unit. The success of this Unmanned Aerial Vehicle, and

the initial response from the operating forces lead to a plan to build and field these systems. The subsequent onset of Operation Iraqi Freedom, caused us to re-prioritize available funds and complete the initial fielding in time to support our Marines during combat operations in Iraq. 20 Dragon Eye aircraft deployed with elements of the 1st Marine Division during Operation Iraqi Freedom. After action feedback from the war confirmed the value of a man-portable small unit level Unmanned Aerial Vehicle and the Dragon Eye Unmanned Aerial Vehicle is now a program of record with initial full fielding starting in May 2004. Moreover, Marines presently returning to Iraq are relying on this capability to provide them with intelligence gathering observation.

As part of Naval Science and Technology's long-term investment in urban combat innovations, the critical need for squad level communications became apparent to enable small units to rapidly coordinate the complex tactics of building-to-building and room-to-room combat. Our British partners in this effort suggested we try a commercial-off-the-shelf radio called the Personal Role Radio, or PRR. Low-cost development of this Commercial Off The Shelf (COTS) item enabled this to be interoperable with our newest small unit tactical radios and we now have communications systems that support units down to the lowest tactical level. Responding to a request by 1st Marine Division, who participated in the PRR experiments, radios were purchased for the deploying infantry units. The PRR will now be part of a Marine Corps wide fielding program. And as I can personally attest, this simple and highly effective addition to the equipment of the Marines in Iraq was an extremely relevant and timely addition.

A third example of successful transition of an experimental system to combat forces in Iraq focuses on the individual rifleman. The Advanced Combat Optic Gun sight known as "ACOG"

exploits what hunters and competitive marksmen have known for years. A quality optic on a quality rifle will enable an average shooter to regularly hit a target at greater distances. After conducting experiments with the ACOG, which confirmed the advantages of this sight, the Science and Technology community provided the test sights along with additional sights purchased to support Marines deploying to Iraq. The response from Marines in combat confirmed that plans for full fielding this device are right on target.

Another great example of how the development of experimental prototypes can be rapidly transitioned to operating forces to meet contingency requirements is seen with the Pre-First In Command and Control project. The Office of Naval Research, and the Marine Corps Warfighting Lab had previously conducted tactical experiments with this system. Pre-First in command and control (Pre-FICCS) offers the commander a highly mobile and fully operational level Command and Control suite. The configuration can be as small as two Highly Mobile Multipurpose Wheeled Vehicles (HMMWV). Comparable conventional Command and Control suites are many times larger and considerably cumbersome to move. When faced with the deployment to Iraq, the Science and Technology community made this system available to I Marine Expeditionary Force. This turned out to be a crucial technology that enabled the Marine Expeditionary Force commander to rapidly establish forward Command and Control that could keep pace with the rapid advance during Operation Iraqi Freedom.

Although the normal interest in what the Science and Technology community provides the warfighter deals with advanced equipment, the same organizations are also involved with non-material solutions that in some cases provide even broader and more significant changes to the

way we fight. Marine Corps Warfighting Lab has dedicated an effort to develop advanced tactics, techniques and procedures aimed specifically at the challenges of urban combat. After a strenuous series of experiments conducted during the late 1990's, the Marine Corps Warfighting Lab developed a comprehensive revision of our tactical urban doctrine as well as a supporting training program to compliment this effort. Initial units that participated in these experiments and conducted these revised urban tactics, used the skills extensively in the villages and cities of Iraq. To ensure our Marines now returning to Iraq have the absolute best training available, the Marine Corps Warfighting Lab is sponsoring an intense training effort for all of the units returning to Iraq that will better enable them to conduct Stability and Support Operations in urban terrain.

Most recently, the Marine Corps Warfighting Lab has re-oriented our main experimentation program titled SEA VIKING to support Marines deploying for Operation Iraqi Freedom II. In its original form, Sea Viking aimed at the transformational capabilities the Marine Corps will need to operate on the dynamic battlefields of the future.

Although the re-deployment to Iraq of Marine forces scheduled to conduct the Sea Viking experiments changed the immediate Sea Viking goals, this presented another opportunity for the Science and Technology community to provide direct support to deploying forces while still maintaining the transformational momentum of the Sea Viking program. One of the central technology areas being pursued by Sea Viking involves on-the-move command and control of dispersed forces operating on an extended battlefield. Sea Viking experiments planned to use a surrogate command and control system called the Experimental Tactical Communications

System or "ETCS" for short. ETCS is based on the commercial IRIDIUM satellite telephone network. Science and Technology development has modified this commercial system to achieve a tactical networked architecture that supports voice and data communications extending to any user, worldwide. A portion of this architecture will provide portable unit, individual vehicle or individual Marine Position Location Information that is interoperable with current Command and Control systems.

By revising the Sea Viking program the Marine Corps now plans to deploy ETCS with elements of the I Marine Expeditionary Force returning to Iraq, while still maintaining the integrity of the Sea Viking long-range experiment goals.

The Science and Technology efforts I have addressed are only a small representation of the tremendous work that a number of people and organizations successfully undertook to support the warfighter in Operation Iraqi Freedom.

While the context of Iraqi Freedom has changed, (some refer to it as Iraqi Freedom II,) the level of commitment and desire of the Science and Technology community to support those going in harms way remains unchanged. For example, standing working groups and cells within the Office of Naval Research and at the Marine Corps Warfighting Laboratory work in tandem with the operational forces, the Expeditionary Force Development Center and the Marine Corps Systems Command, under the leadership of the Deputy Commandant for Combat Development in defining requirements, identifying capability gaps, determining potential technology solutions and finally delivering sorely needed capabilities to the warfighter. Examples of these range

from Counter Improvised Explosives Devices technology to Explosive Resistant Coatings. These types of efforts are outlined in weekly Science and Technology Support to OIF –2 Situation Reports that are disseminated widely within the Department of the Navy. Additionally, the Iraqi Freedom Combat Assessment Team the Marine Corps deployed to Iraq to leverage and act upon lessons learned, includes Science and Technology personnel. This team is only one way the Naval Services are insuring that there is an open line of communications between deployed warfighters an the Science and Technology community.

In summary, as an operator I see this as a good news story. The more traditional approach to Science and Technology supporting the warfighter has evolved into a more proactive, responsive and supportive process, which will pay great dividends to today’s warfighter as well as tomorrow’s warfighter. While my comments today have principally focused on how the Science and Technology community has become more responsive to the warfighter, I think it is important to note that these efforts would not have been possible had it not been for the long-term vision and commitment of those professionals involved in planning and executing Science and Technology programs. We leverage today their past work and while we have focused on their many successes it must also be noted that Science and Technology development is inherently risky. Every fielded success probably has a matching effort that ended up in the dustbin. Consequently, we must ensure that especially today we not only satisfy the emergent needs of the Global War on Terror, but also continue to judiciously invest in higher risk, long-term discovery and invention.