Executive Summary

Background

The challenges and risks to Marine Expeditionary forces in the contemporary operational environment are well known. What is less well known is the emergent risk associated with the employment of precision weapons against U.S. forces – particularly during an amphibious assault. If amphibious operations are to remain a core capability of the Marine Corps, steps must be taken to understand and counter this evolving threat.

The study, sponsored by the Commanding General, Marine Corps Combat Development Command, provides an overview of the precision weapon challenge, insight into the technology for countering the weapon, and recommendations for the Marine Corps' response to the challenge.

The study terms of reference led the Panel to: characterize known and potential precision weapons and munitions types; review and assess the current and planned Marine Corps policies, strategies, approaches (including training), and capabilities for responding to potential precision weapons; identify promising science and technology areas; and to recommend initiatives that should be undertaken by the Marine Corps for responding to the exploitation of precision weapons by our adversaries.

Findings

The Threat: Precision weapons are generally considered to be categorized as guided rockets, artillery, mortars, and missiles (G-RAMM). The threat from precision weapons is current and real – although sophisticated CONOPS, integrating Intelligence, Surveillance and Reconnaissance (ISR) to support coordinated attacks is considered a far-term threat. During recent U.S. operations in Iraq, Afghanistan and elsewhere, military and intelligence units forcefully demonstrated the lethality of U.S. produced precision weaponry across a wide range of operations and terrain. Rough equivalents of these extremely precise weapons systems are now being produced by our peer competitors. Accordingly, these weapons will undoubtedly proliferate among unfriendly countries and terrorist groups operating in the littorals. In fact, it was reported that various types of precision weapons were pilfered from unguarded Libyan ammunition bunkers after the demise of Col. Gaddafi's regime in late 2011.

Technology applications: To meet the challenge of countering precision weaponry, the U.S. Army is investing in a system to protect forward operating bases in the theater of operation. Despite significant weight, cube, and ammunition requirements, the Army is modifying a Navy-developed PHALANX variant that uses kinetic rounds to defeat incoming rockets, artillery, mortars, and missiles – whether they are guided or not. Its 26 ton weight (without ammunition) rules out its use for Marine expeditionary operations. Also, there is a joint service program called RELI –Robust Electric Laser Initiative – to develop a high energy laser (HEL) weapon to dazzle, damage or degrade precision weapons, or destroy sensors used for precision weapon targeting. UAVs are important both as potential precision weapons and as over-the-horizon targeting platforms. The Expeditionary Maneuver Warfare & Combating Terrorism Department (Code 30) of the Office of Naval Research will leverage RELI for their Future Naval Capability S&T effort GBAD-OTM – Ground-Based Air Defense on-the-Move. It will investigate the feasibility of using a high energy laser linked to ground radar to disrupt low and slow UAVs targeting deployed Marine units. It was also noted that unmanned systems offer new capabilities for Marines – especially when utilized to replace manned connectors during ship-to-shore transit.

Technology limitations: The DOD has spent years and millions of research dollars in developing high energy lasers. But, there continue to be barriers for a fully capable HEL system – including economic, policy, and technology-based issues. To generate the requisite power and beam quality for target disruption, large heavy-weight systems are required. Environmental factors and the threat to friendly systems (e.g., helos and low orbit satellites) will degrade effectiveness. There is a ready market for industrial lasers whose beam quality at high power will not meet the needs of a weapons system. This means that DOD must be the leader (and bill payer) for the development of a truly high energy laser market. Also, the low "duty cycle" – laser shooting time vs. recharge time – may require the use of multiple, integrated systems.

Process limitations: During the fact-finding phase of the study, the Panel was offered several overview "process" briefings to enhance the Panel's understanding of the policies, strategies, and approaches to amphibious warfare under the threat of precision weapons. Also, several Panel members observed the Amphibious Capabilities Working Group (ACWG)

wargame. The Panel feels there is a lack of emphasis in the expeditionary force development process on the precision weapons threat, especially in the emphasis on identifying specific near and long-term threats associated with commercial technology applications that directly support precision weapons systems (e.g., Google Earth, etc.). This goes hand-in-hand with a lack of specific emphasis on experimental testing of precision weapons threats in realistic environments. Also, current efforts seem to lack a holistic approach to counter the threat – a process that leads to interrupting the precision weapon's C3ISR capability or through the use of obscurants, decoys, and deception.

Recommendations

The Panel makes a number of specific recommendations to enhance the expeditionary force development process: promote the acquisition of threat weapons systems; accelerate the analysis of precision weapon weaknesses and vulnerabilities; accelerate the transition of threat vulnerability analyses into countermeasures options via S&T initiatives, program planning, and CONOPS development; test the effectiveness of countermeasures and tactics in laboratory & operational environments (e.g., Black Dart); integrate threat analyses, countermeasures, and S&T planning into the expeditionary force development process; conduct experiments on the use of airborne platforms and/or electronic support measures to track small, slow, low-flying UAVs; design and conduct experiments on the use of current and planned unmanned platforms; design and conduct experiments on Cyber and Electronic Attack threats and countermeasures in amphibious environments; and, establish an *Integration Cell* to support, sponsor, and monitor the activities outlined above.