

Special Operations Forces



Industry Conference

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Technology Development Objectives

Engineering, PEO Maritime



MARITIME SYSTEMS



Agenda

- **Technical Development Objectives Definition**
- **Technology Areas of Interest**
- **How to present your response to USSOCOM**



Technical Development Objectives

- **Definitive quantitative objectives to better inform researchers about the state-of-the-art and where USSOCOM would like technology progress focused**
- **We desire SIGNIFICANT increases in capability of combat systems within the PEO's portfolio**



Undersea Vehicle Energy Storage Systems

- **Current Status:**
 - **SOF requires advanced energy storage systems which have significantly higher storage capacity**
 - **Existing systems use Silver-Zinc Batteries**
 - **Lithium-ion Systems present significant risk (mitigation strategies required)**



Undersea Vehicle Energy Storage Systems

- **Objective:**
 - **Meet or approach a performance objective of storing and delivering 1.5 kWh per liter and/or 0.6 kWh per kg of electrical energy**
 - **Consider fuel cells or other types of sources that deliver similar energy**
 - **Mitigate risk of high energy density thermal run-a-way**



Combat Swimmer Thermal Protection

- **Current Status:**
 - **Combat Swimmers require thermal protection / regulation (Cold / Warm)**
 - **Wetsuits: Reduce water flow across the diver's body increasing temperature of water near diver's body which decreases difference in temperature**
 - **Dry suits: Surrounds diver with air which has less heat transfer**



Combat Swimmer Thermal Protection

- **Objective:**
 - Thermal protection in ambient water temperatures anywhere for 2-35 degrees C for 12 hours. (Maintain dexterity and core temperature @ 37 degrees C)
 - Provide protection for diver's extremities and core, such that the diver will not have reduced off-gassing in the extremities due to decreased blood flow



Lightweight, Small Volume CO₂ Removal Technology

- **Current Status:**
 - Existing underwater breathing apparatus (UBA) systems (Mk 25 and Mk 16) have an absorbent volume between 2.9 and 4.0 liters
 - The ratio of CO₂ volume absorbed to absorbent volume (VRCO₂) at 21°C for each of these systems is VRCO₂=120
 - As the temperature decreases, present systems remove less CO₂



Lightweight, Small Volume CO₂ Removal Technology

- Objective:
 - CO₂ removal technologies that can meet or approach a performance objective of 240 VRCO₂ over a temperature range of 2°C to 35°C and demonstrates equivalent or decreased breathing resistance as current systems



Surface Systems Craft Propulsion Systems

- **Current Status:**
 - **SOF combatant craft require advanced power systems that provide significantly better power/weight ratios (e.g., maximum hp/lb) at top speed and significantly better fuel efficiency (e.g., (lb/hp-h)) at the most efficient speed (cruise speed)**
 - **Current craft engines have a power/weight ratio of approximately 0.38 hp/lb at maximum speed and a specific fuel consumption of 0.35 lb/hp-h at cruise speed**



Surface Systems Craft Propulsion Systems

- **Objective:**
 - **Power/weight ratio of 1.0 hp/lb and/or fuel efficiency of 0.1lb/hp-h at cruise speed.**
 - **2000 hours between overhauls**
 - **Burn High Sulfur Fuel.**
 - **Multi-Fuel Engine**
 - **DFM to JP-8 (including bio-fuels)**



Lightweight Armor

- **Current Status:**
 - Dyneema based Armor is installed on the Special Operations Craft Riverine
 - Provides NIJ Level III protection
 - Captures bullets off angle to prevent ricochet and fragmentation
 - Approximately 3.5 pounds per square foot
- **Objective:**
 - NIJ Level IV protection
 - Capture bullets at all incidence angles
 - Lighter than 3.5 pounds per square foot



Wireless Intercom Communication

- **Current Status:**
 - **Current Intercom System on Craft is tethered to user**
 - **Connected to Type I encrypted radios**
 - **Six Channels can be selected**
- **Objective:**
 - **Equivalent Wireless System**
 - **All wireless communications are Type I encrypted**
 - **Use of system that can be slightly modified in order to avoid full NSA certification process**
 - **Pass full video among users and external sensors**
 - **Use of other than normal frequencies**
 - **Signal is attenuated to below noise floor levels outside craft confines**



Other Technology Areas of Interest

- **Nano-technology that renders maritime equipment, including electronics, impervious to seawater penetration**
 - **Instead of waterproof bags**
- **Anti-corrosion Metallurgical Process for Metal Components**
 - **Metallurgical process that provides maximum corrosion protection for all metals used in SOF maritime equipment that is not a plating or coating**
 - **This includes engine components, weapons, communications, navigation, dive equipment, hull, mechanical, etc.**



Other Technology Areas of Interest

- **Long Range Underwater Communications**
 - Greater range than existing systems without repeaters or surface gateway
 - LPI/LPD
 - Small, lightweight, compact
 - Integrate with other electronic equipment
- **Miniaturization of UBA**
 - Oxygen sensors that are linear above 1.0 PO₂
 - CO₂ Sensors working in UW
 - Scrubber technology as described earlier
 - Lightweight Oxygen Flasks



Other Technology Areas of Interest

- **Health Monitoring of Divers**
 - **Derived Core Temperature (not the pill)**
 - **Respiration Rate**
 - **Heart Rate**

- **Diver Protection**
 - **Thermal**
 - **Contaminated Water – both Chemical and Biological**
 - **Abrasion, Laceration and Puncture Proof**
 - **Health Monitoring Integrated**



Contacting SOCOM

- **Submit a white paper in response to TDOs prepared by PEO Maritime**
- **Contact TILO office with white paper**

**If we do the same thing we have always done
we will get the same result we have always gotten!**

