Ground and Sea Platforms Community of Interest

Executive Steering Panel: Dr. John Pazik (USMC, ONR30), Dr. Thomas Fu (USN, ONR33), Dr. Jennifer Hitchcock (USA, TARDEC)

Scope Technical Challengesand

1.0 Platform Protection

Those capabilities that allow a platform and its crew to remain functional and mission capable in a hostile threat environment. This includes denying the adversary the ability to target and successfully engage a platform (susceptibility), withstanding the weapon effects of a successful attack (vulnerability), and restoring functionality after sustaining damage (recoverability).

- **1.1** Improved Blast Protection
- **1.2** Directed Energy Threat Mitigation
- **1.3** Enhanced Ballistic Protection
- **1.4** Hit and Kill Avoidance
- **1.5** Detection Avoidance (Signature Management)
- **1.6** Enhanced Cyber Defense

2.0 Lightweighting the Platform

Those capabilities that reduce the weight of a platform and its systems to allow the force to be more lethal, expeditionary, and agile across the full range of operations. In addition to structural and material science advances, lightweighting will consider advanced propulsion and alternative power systems, active protection techniques, and advanced weapons and electronics.

- **2.1** Reduced Weight of Armor and Structure
- **2.2** Reduced Weight of Mobility Systems
- **2.3*** Reduced Weight of Armaments
- **2.4*** Reduced Weight of Electronics, Sensors, and Other

* Primary contributions from other COIs

3.0 Platform Maneuverability

Those capabilities that provide an agile, mobile, and survivable platform and force to extend the operational reach across all potential battlefield environments. The force must maintain a high operational tempo while maneuvering in space and time and minimizing the logistics burden.

- **3.1** Unconstrained Mobility
- **3.2** Improved Design for Higher Speed
- **3.3** Enhanced Propulsion
- **3.4** Enhanced Energy Efficiency

4.0 Manned-Unmanned Teaming

Those capabilities that affect operational and tactical mobility and maneuver through the use of unmanned systems. These include unmanned ground vehicles, robots, sea vehicles, UxV swarms, etc. that will work collaboratively with the Warfighter. These systems will serve as force multipliers, able to collaborate and share information while reducing operator workload by relieving the individual Warfighter of physical and cognitive burdens.

- **4.1** Enhanced Platform Autonomy
- **4.2** Optimized Platforms by/for Unmanned Operations
- **4.3** Enable Configurable Autonomous & Unmanned Payloads
- **4.4** Enhanced Assured Trust in Unmanned Systems

5.0 Enhanced Platform Maintenance

Those capabilities that reduce the total ownership costs to maintain ground and sea vehicles and equipment. This includes increasing the operational availability of platforms while decreasing the maintenance cost and man-hours required to maintain and repair these platforms.

- **5.1** Condition Based Maintenance
- **5.2** Advanced Manufacturing for Rapid Component Replacement
- **5.3** Advanced Corrosion & Wear Resistant Systems

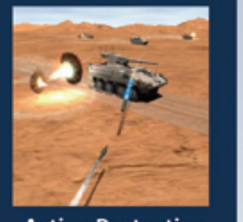
Focus Going Forward

Cyber defense of vehicle networks

Hard and soft kill options for Counter-UAS

Adaptive Armor

Directed Energy Defeat



Active Protection

Lightweight Track, suspension, powertrain, and other mobility systems

Low cost, high mass efficiency passive armor

High water speed for amphibious combat vehicles

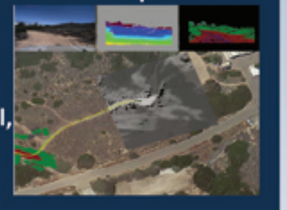
Fuel efficiency and power enhancements

Higher power density and onboard power sources

Autonomous logistics and convoy operations

Unsupervised unmanned surface operations

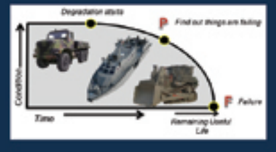
Autonomous navigation in GPS denied, degraded visual, and complex terrain



Enhancing trust in unmanned systems

Improved chemical agent and corrosion resistant coating techniques

Condition-Based Maintenance



Additive Manufacturing for Replacement Parts

Success Stories

Occupant Protection: The Army's Occupant-Centric Protection and Military Standards development work provides the military vehicle requirements developer validated, quantitative, medically-based and measurable crew survivability requirements. The Army, Navy, and Marine Corps acquisition, design, and testing community can use the work to experimentally verify a survivable vehicle design.

Autonomy: Army/TARDEC has collaborated with ONR on an open autonomy kit based on interoperability for Optionally-Manned vehicles. The Army has leveraged ONR's work in autonomy, in particular, fielding the autonomy kit on unmanned all-terrain vehicles as part of their Dismounted Soldier Autonomy Tools (DSAT) program.

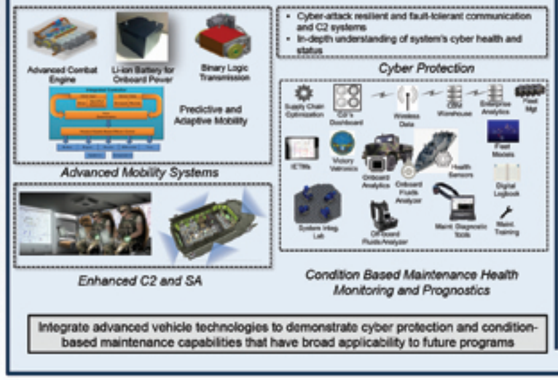
Modularity: ONR's Vehicle Agnostic Modularity (VAM) project is leveraging TARDEC's "Modularity Framework" program. VAM will leverage this framework and populate it with USMC requirements to evaluate the military utility of modular design options against a set of vignettes. This will establish the beginning of a virtual framework which to evaluate modularity in an operational context across the DOTMLPF spectrum that can be used by all services.

Additive Manufacturing: ONR Quality Made (additive manufacturing) program was informed by the TARDEC's roadmap that focused on new additive repair technologies, with the ONR effort tailored to leap over repair to address direct metal deposition of parts.

Enhanced Ballistic Protection: Army (ARL, TARDEC) focus on larger threats while ONR is focused on light KE threats. This allows ONR to focus on expeditionary light armor and transparent armor for application to USMC ground vehicles, ACV, and NSW/ NECC boats, while still potentially benefitting from Army investments in higher end protection against larger caliber rounds.

Proposals to Shape Capability Needs

Next Generation Cyber-Protected, C2, and CBM-Enabled Ground Vehicle Prototype



Ground Mobility Autonomy Army-Marine Corps Collaboration