TEME CERCETARE DARPA 2016

a. Soldier/Squad Technologies

1. TTO is interested in technologies that dramatically enhance the capabilities of the individual soldier and squad by an order of magnitude. Approaches are sought to improve the quality and range of situational awareness including knowledge of the status of friendly forces, hostile forces, and the environment both in visual range and beyond. Improvements in the ability of a squad to neutralize opposing forces rapidly, through precisely tailored means, and improved precision of effects are of special interest. This includes integrated and networked munitions enabling rapid, precise tailored means, and improved precision of effect for squad level forces and tactical units. TTO seeks approaches to improve squad mobility and endurance for both mounted and dismounted situations. Improvements in effectiveness in urban environments are sought, especially in the areas of situational awareness and tailorable effects derived from advanced electromagnetic warheads, advanced reactive materials, and advanced hybrid warheads. TTO is also interested in tailorable precision non-kinetic capabilities.

2. TTO's interests also includes interaction of autonomous system behaviors with sparse supervisory human control in application-of-force scenarios; technologies enabling efficient human to robotic interaction; unmanned platform, perception, control, and interaction technologies to assist with completing tasks associated with human assistance and disaster relief scenarios; and new approaches to reduce the cost of defense by countering the increasing cost of manpower and technologies to reduce the operator burden/workload.

3. TTO seeks a means to support small unit command including communication, planning, and execution. Methods to leverage unmanned systems to promote personnel safety and stand-off engagement are of interest as well as improvements in the soldier-system interfaces. Approaches to reducing soldier load are of interest, including light-weight means of providing power, and light-weight weapon systems.

4. TTO's interest in a focus of Soldier/Squad Technologies includes: scalable adaptive machine learning developments enabling effective autonomous platforms, and cooperative manned and unmanned operations across multiple domains; technologies to provide situational awareness to support decision making beyond basic data gathering; built-in platform technologies to provide the attributes necessary to build real-time interpretive models to enable operations in contested and complex environments; and game changing cooperative engagement of manned and sparsely supervised autonomous unmanned vehicle systems with distributed engagement of remote capabilities to service critical targets that support the defeat of all types of enemy forces.

b. Combat Vehicles

1. TTO seeks a means to improve combat vehicles (platforms) in dimensions such as agility, extreme mobility, weight reduction, transportability and supportability, survivability, load capability, crew augmentation, and endurance. TTO is interested in enhanced combat vehicle lethality (small to large caliber) utilizing precision.

2. TTO is interested in game changing ground systems that encompass: innovative thermal management and acoustic signature reduction technologies to enable effective reconnaissance in close contact to rapidly develop situation awareness; an efficient means for detection and neutralization of explosives at extended standoff ranges while reducing soldier burden and workload; and agile avoidance and adaptive self-protection capabilities.

3. TTO is interested in combat ground vehicle technology that leverages autonomy to promote mechanized infantry survivability, lethal stand-off engagement, and/or personnel safety. This includes novel approaches to the combat ground vehicle system which incorporates light-weight weapon systems and/or a light-weight means of providing power.

c. Tactical Operations in Complex (Urban, Forest/Jungle, and Arctic) Environments

1. TTO seeks a means to enhance urban mobility through novel approaches to circumvent urban obstructions and by leveraging subterranean and the vertical dimensions. TTO seeks means to enhance forest and jungle mobility through novel approaches to maneuver around or through dense forested environments. TTO seeks means to enhance arctic mobility through novel approaches to overcome challenges of the unique terrain and environmental effects of extreme cold conditions. Effective means of urban soldier resupply and reach-back support are also sought.

2. TTO is interested in a means to improve situational awareness in the complex urban environment. For urban terrain, this includes detecting, tracking, and targeting of mobile and fixed threats including those above and below street level as well as those concealed in buildings and other urban artifacts. In forest/jungle terrain, this includes custody of threats at and above canopy level as well as those concealed between different layers of canopy and underground. Under arctic conditions, this includes custody above/below the surface as well as those concealed by snowstorms or other weather events. TTO is also interested in technologies for providing reliable blue force situational awareness as an approach for continuously tracking threats through complex urban, natural, and extreme weather environments.

3. TTO is interested in weapon systems adapted to the urban, forest/jungle, and arctic environments including those with autonomy-enabled rapid response and the capability to engage at extreme short range without fratricide. Additionally, TTO seeks capabilities for engaging in all environments under degraded visual conditions. Means are sought to affect seamless target handoffs and coordinated engagements for increased impact. TTO desires weapons that are rapidly tailorable across the spectrum of non-lethal to lethal and across a wide range of target hardness. Means to improve effect precision to avoid collateral damage are desired. Systems are sought that increase force projection effectiveness, yet are easily ported through the environment by individual soldiers.

4. TTO seeks capabilities to temporarily or permanently disable infrastructure and transportation platforms. Also sought are creative uses of autonomy adapted to the urban, forest/jungle, and arctic environments to reduce exposure, enhance mobility, improve situational awareness, and serve as a force multiplier. This includes advanced strike methods or technologies that improve end-game precision engagement such as target detection, identification, location, tracking, attack, and assessment.

ALTE IDEI CERCETARE DARPA

Since its inception in 1992, DARPA's Microsystems Technology Office (MTO) has helped create and prevent strategic surprise through investments in compact microelectronic components such as microprocessors, microelectromechanical systems (MEMS), and photonic devices. MTO's revolutionary work applying advanced capabilities in areas such as wide-band gap materials, phased array radars, high-energy lasers and infrared imaging have helped the United States establish and maintain technological superiority for more than two decades. As MTO evolves to address future challenges in microsystems, the office has identified four target problem areas: (1) our critical reliance on the electromagnetic spectrum, (2) the decentralization of effects within the battlefield, (3) the impending end of Moore's law, and (4) embracing and thriving in the internationalized technology base. There is inherent overlap between these spaces which is rife with opportunity to explore solutions.