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Weapons COI and Taxonomy Descriptions

Weapons Technologies COI
The Weapons Technologies COI serves as the mechanism for the Components to understand technical capabilities and roadmap / integrate S&T efforts to address operational challenges, mitigate foreign threats, affordably-extend weapons performance, and develop leap-ahead offsets. Technology development thrusts (sub-areas) involve *guidance navigation & control and data links (GN&C), ordnance*, *propulsion*, *undersea weapons*, *high energy lasers (HEL), radio frequency (RF) weapons, and non-lethal weapons*. Advances in technology thrust areas are integrated, prototyped, and demonstrated in the *Guided Weapon Demonstrators (GWD)* sub-area. The applications for the technologies in this COI are air, naval, ground, offensive, defensive, tactical, theater, or strategic weapons including missiles (conventional and hypersonic), bombs, rockets, artillery, mortars, torpedoes, mines, guns, launchers, and projectiles.

Guidance, Navigation, & Control and Data Links
The Guidance, Navigation, & Control and Data Links sub-area includes weapon position, navigation, and timing (PNT), networked precision (data links and seekers), and high speed guidance (maneuver algorithms and radomes). It encompasses software and hardware components that enable a weapon to know precise time, its position and attitude, the ability to predict and shape its trajectory, and the ability to communicate with networked assets for the purpose of exchanging data on the state of the weapon as well as the state of the intended target. The navigation function is performed by algorithms that take inputs from sensors, e.g. inertial measurement units (IMU) / devices and GPS receivers, and processes those inputs to produce the position, velocity, acceleration, etc. of the host platform. The platform's guidance algorithms utilize inputs from sensors/seekers and the navigation system to effect modifications to the platform's trajectory to put it on the desired path to the intended destination/target. The control system takes the desired trajectory modifications from the guidance system and translates them into actuation commands that generate forces and moments through the use of aerodynamic surfaces, thrust/reaction controllers etc. Data links provide the platform with the ability to communicate with other networked assets for the purposes of exchanging information about its state and targets.

Ordnance
The Ordnance sub-area coordinates all S&T pertaining to explosives, reactive energetic materials, warhead casing materials and explosively accelerated damage mechanisms, penetrating warheads, the fuzing mechanisms of initiation, safe and arm mechanisms, and the integration of these components for what is coined an 'ordnance package'. The sub-area also includes innovative concepts that maximizes system capabilities and employment of these ordnance concepts in novel methods to achieve military objectives.

Propulsion
The Propulsion sub-area includes propulsion S&T for guns, tactical missiles (rocket and air breathing), strategic missiles, missile defense boosters, and divert and attitude control systems (DACS) These applications operate over short range to extremely long range with additional operational requirements (e.g. impetus, energy management (pintle/pulse motors), temperature (sometimes coupled with acoustic input), DOT hazard classification and insensitive munitions). The solid rocket motor solutions for these applications develop advanced high specific impulse propellants (minimum

signature, reduced signature and high performance (smokey)), propellant to insulation bondlines and liners, lightweight structures (case, insulation, nozzles) and attitude control thrusters. Air-breathing scramjet propulsion for weapons applications develops scramjet ignition and combustion technology with high efficiency fuels and lightweight structures. Strategic system 4th stage/post boost vehicles and missile defense kill vehicles using liquid rocket thruster technologies rely on the Space COI community for developing and advancing this technology.

Undersea Weapons
An undersea weapon is any device or system that provides “hard kill” or “mission kill” against a naval platform (principally a ship or submarine) or another weapon and delivers this capability within, or substantially through, the ocean sub-surface. This includes, but is not limited to, torpedoes, torpedo decoys and jammers, anti-torpedo torpedoes and underwater projectiles.

High Energy Lasers (HEL)
The High Energy Laser (HEL) sub-area coordinates all S&T pertaining to high-power, high-efficiency laser sources, including power sub-systems, thermal management, beam directors, beam propagation, and laser effects. Focus areas include laser sources (development of pulsed and continuous-wave laser sources to include solid state (slab) technology, fiber lasers and combining technology, and gas laser sources) and advanced beam control (development of light-weight beam directors, high-throughput beam directors, conformal arrays, atmospheric compensation and adaptive optics).

Radio Frequency Weapons (RFW)
The Radio Frequency Weapons (RFW) sub-area coordinates all S&T pertaining to high power RF systems, including pulsed power sources, micro-/millimeter wave sources, and antennas (conventional, flat, conformal). Focus areas include pulsed power sources (development of high-peak power waveforms with short peak rise times and high energy per pulse, high pulse repetition rates, and optimized frequencies), high power micro-/millimeter-wave sources (development of conventional and solid-state compact, electrically efficient sources), and antennas (development of conventional, flat, and conformal arrays for use with next generation HPM /RF systems and improve gain/directivity of antennas to increase range, and reduce size, weight, and power (SWAP)).

Non-Lethal Weapons (NLW)
The Non-Lethal Weapons sub-area coordinates all S&T pertaining to both kinetic (rubber bullets, etc.) and directed energy (lasers and high power RF systems) technologies used for non-lethal weapons applications. Applications include counter-personnel (development of smaller, lighter, and lower cost Active Denial Technology (ADT) 95 GHz millimeter wave sources to demonstrate “repel effects” and developing antenna gimbal for solid-state ADT demonstrator), counter-materiel (maturing and demonstrating directed energy technologies capable of stopping vehicles and vessels at operationally-relevant standoff distances, researching and assessing the feasibility of directed energy technologies for other counter-materiel missions, and improving the size, weight, and performance of component and subsystem technologies), and human effects (characterizing ADT bio-effects trade space (effects vs. risk vs. system requirements) and non-lethal human effects modeling and simulation capability development).

Guided Weapon Demonstrators (GWD)

Guided Weapon Demonstrators (GWD) sub-area integrates, prototypes, and demonstrates key technologies developed in *guidance navigation & control and data links (GN&C), ordnance*, *propulsion*, *undersea weapons*, *high energy lasers (HEL), radio frequency (RF) weapons, and*/or *non-lethal weapons* sub-areas. GWD sub-area proves the effectiveness and advancement of technology / integration to a TRL-6 level through weapon flight or live-fire demonstrations.