



# Overview to Industry

*Mr. Timothy Ryan*  
16 August 2017

UNPARALLELED  
**COMMITMENT  
& SOLUTIONS**

*Act like someone's life depends on what we do.*



U.S. ARMY ARMAMENT  
RESEARCH, DEVELOPMENT  
& ENGINEERING CENTER



U.S. ARMY  
**RDECOM**

# RDECOM MISSION & VISION



## MISSION

*To ensure decisive capabilities for unified land operations to empower the Army, the joint warfighter, and our Nation.*

## VISION

*The preeminent world leader in research, development, and engineering.*

**U.S. ARMY**  
**RDECOM**<sup>®</sup>  
**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**



U.S. ARMY  
**RDECOM**

# WHAT WE DO



**ARL**

ARMY RESEARCH  
LABORATORY



**ARDEC**  
ARMAMENTS

**ARMAMENTS**

- Munitions Systems & Technologies
- Integrated Weapon Systems
- Energetics, Warheads & Manufacturing
- Guidance, Navigation & Control
- Fuze & Precision Armament Technology
- Cross Domain Fires



**AMRDEC**

AVIATION AND  
MISSILE

- Airframe Structures
- Rotors & Rotor Systems
- Sensors and Seekers
- Guidance, Navigation, and Control
- Propulsion
- Counter-UAS
- Visualization
- Anti-Access/Area Denial
- Missile Defense



**CERDEC**  
US ARMY-RDECOM

COMMUNICATIONS-  
ELECTRONICS

- Mission Command
- Tactical and Deployed Power Operations
- Tactical Cyberspace Operations
- Electronic Warfare
- Intelligence, Surveillance, Reconnaissance and Targeting
- Network
- Prioritize Position Navigation and Timing (PNT)



EDGEWOOD,  
CHEMICAL  
BIOLOGICAL  
CENTER

- Chemistry and Biological Sciences
- CB Agent Handling and Surety
- CBRNE Materiel Acquisition
- CBRNE Analysis and Testing
- CBRNE Munitions and Field Operations



NATICK SOLDIER

- Advanced/Multifunctional Materials
- Biomechanics
- Cognitive & Behavioral Sciences
- Food Science
- Geographic/Precision Guided Systems
- Soldier Performance Optimization
- Biological Technology
- Neuro-cognition



**TARDEC**

TANK AUTOMOTIVE

- Ground Vehicle Survivability
- Autonomy-Enabled Systems
- Vehicle Electronic Architecture
- Ground System Software
- Ground Vehicle Power & Mobility
- Robotics/Autonomous Systems
- Combat Vehicles
- Advanced Protection Systems

**Delivering capabilities for the Army, joint warfighters, and our Nation**



# ARDEC CORE COMPETENCIES



RESEARCH



DEVELOPMENT



PRODUCTION



FIELD SUPPORT



DEMILITARIZATION

## Munitions Engineering & Technology Center:

*Provides life-cycle engineering research, development, production, field support and demilitarization for all integrated munitions systems.*

- Propellants; explosives; pyrotechnics; warheads; fuzes; insensitive munitions; environmental technologies and explosive ordnance disposal; aero ballistics and telemetry

## Weapons and Software Engineering Center:

*Generates technologies and executes life-cycle research, design development, production engineering and sustainment of programs related to weapons and weapon systems.*

- Small, medium and large caliber weapons design, experimentation, evaluation, manufacturing, and integration; digitization; and embedded system software; directed energy; technical and tactical fire control; homeland defense

## Enterprise & Systems Integration Center:

*Serves as ARDEC Executive Agent to ensure cost, schedule, performance adherence, and sustainability through the integration of technical and business competencies.*

- System engineering; quality engineering; logistics engineering; project management; business development; S&T; financial & knowledge managements



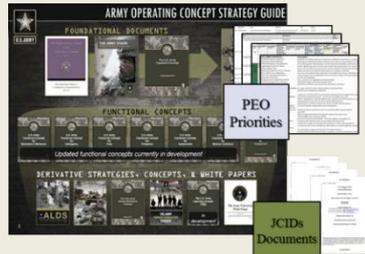
# MULTIPLE WAYS TO DO BUSINESS



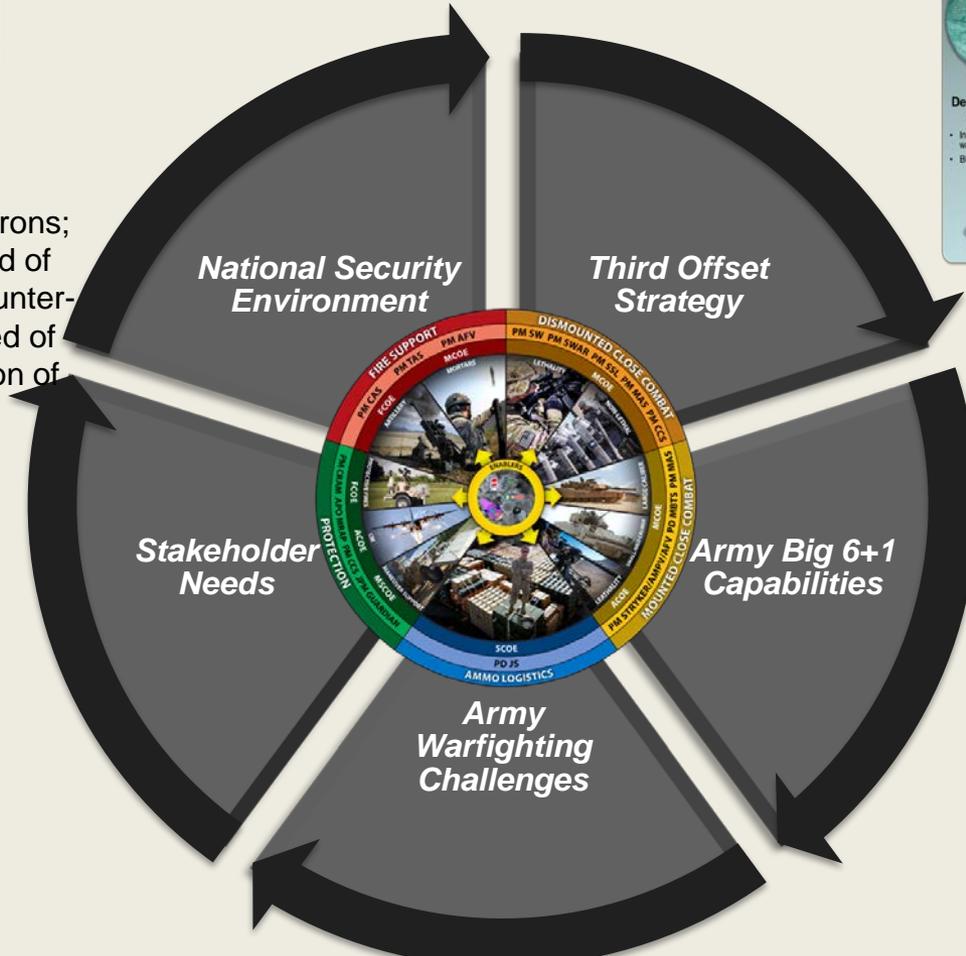


Congested and Restricted Environments; Potential for Overmatch; Spread of Advanced Cyberspace and Counter-space Abilities; Increased Speed of Human Interactions; Proliferation of Weapons of Mass Destruction

Identification, coordination, organization of individual "Source Documents" needs/gaps/priorities into one list



Enduring, first order problems, the solution to which will improve current and future force combat effectiveness



Framework, governance and strategic communications strategy to prioritize research and development

- Deep Learning Systems**
  - Indications and warnings.
  - Big data analytics.
- Human-Machine Collaboration**
  - Make better, faster decisions.
- Human-Machine Combat Teaming**
  - Working with unmanned systems to perform operations.
- Assisted Human Operations**
  - Help warfighters in all possible contingencies.
  - Wearable electronics, heads up displays, etc.
- Networked Enabled, Cyber Hardened Weapons**
  - Every weapon prepared for a cyber attack.

Asymmetric advantage - Capitalize on our strengths, exploit our enemies weakness

Competitive strategy to achieve decisive, asymmetric operational advantage, gain technological overmatch, and eliminate parity

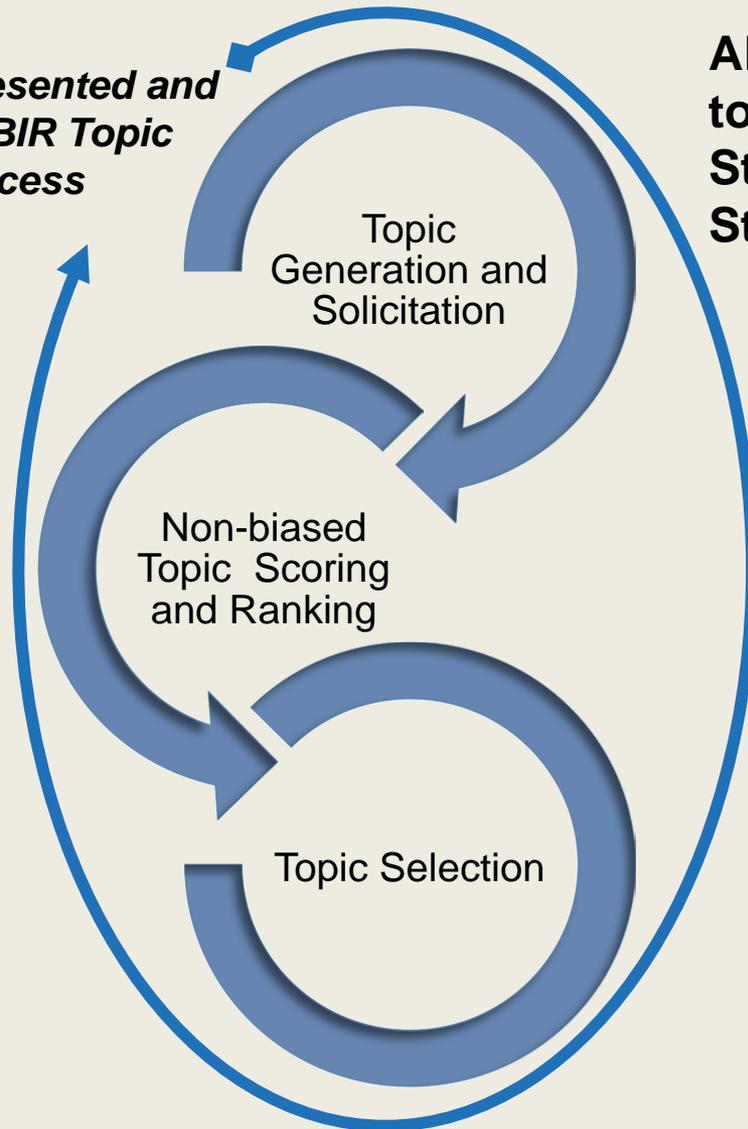
- Future vertical Lift**: Perform missions currently conducted by fixed wing aircraft
- Combat Vehicles**: Ensure maneuver formations overmatch
- Cross Domain Fires**: Achieve effects which create multiple dilemmas for the adversary
- Advanced Protection**: Apply vehicle appropriate hostile fire detection and neutralization
- Expeditionary Mission Command/ Cyber Electromagnetic**: Exploit an advantage over enemies in cyberspace and the electromagnetic spectrum
- Robotic and Autonomous Systems (RAS)**: Enhance formations with manned-unmanned teaming
- Soldier performance/ Team Overmatch**: Cross cutting capability (+1)



- Non-kinetic effects that enable multi-domain defeat of threats for indirect fires
- Reduced cost tactical grade IMUs
- Reduced cost, high reliability control actuation technologies that enable high g maneuver
- Imagers that can operate in all conditions (obscured, clouds, weather)
- Higher density power sources that enable extended time of flight and survive long term storage
- Reliable, gun hardened, fuzing components w/ focus on air burst & proximity
- Advanced warheads against personnel and light vehicles
- Novel energetic and non-energetic materials



*PMs are represented and involved in SBIR Topic Selection Process*



**All proposed SBIR topics are linked to the ARDEC Armament S&T Strategic Plan and the ARDEC Stakeholder Needs**

- Topics are solicited for and submitted in a centralized data system that allows for standardized, searchable data
- Topics are scored against set criteria and ranked utilizing statistical methods which remove bias between topics and between scorers
- Representatives from PMs actively participate in SBIR topic selection to ensure maximum transparency, communication and buy-in



## Warfighting Functions

### Movement and Maneuver

### Maneuver Support

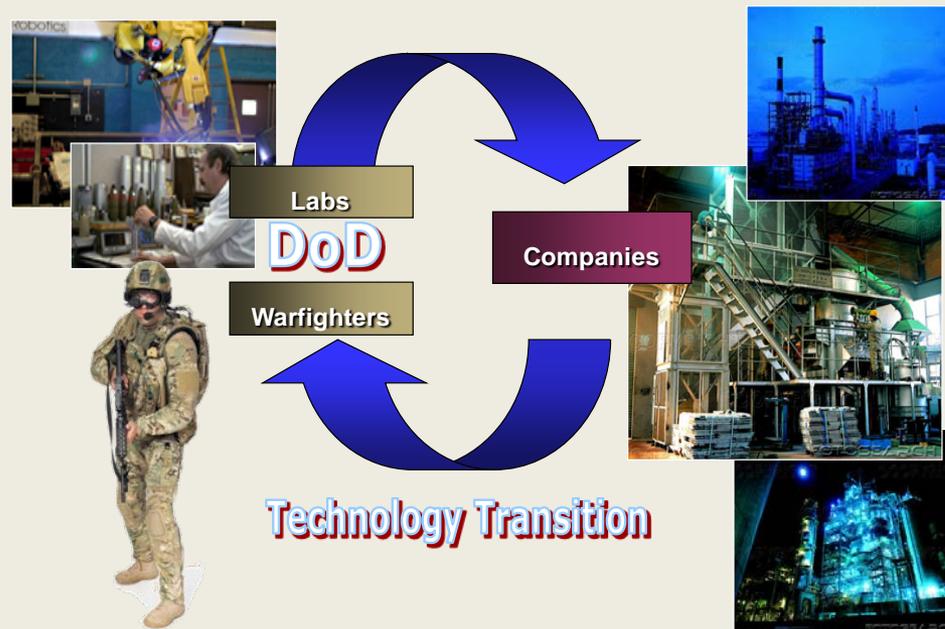


<b>Technology</b>	Texas Research Institute Austin: Munitions Packaging	Surface Optics: Hyperspectral Imaging Technology	Robotic Research: Urban Mapping and Positioning System (UMAPS)
<b>Benefit</b>	Injection molding and mold design for composite munition canisters for tank rounds.	Army sniper rifle targeting scopes and for use in detecting camouflaged objects.	Tracking and mapping technologies for advanced capabilities
<b>Transition(s)</b>	FY16 Transitioned for Government and Commercial use, i.e., for PING Inc	FY16 Transitioned to DoD proponents	FY16 Transitioned to DoD proponents, Homeland Defense, FEMA



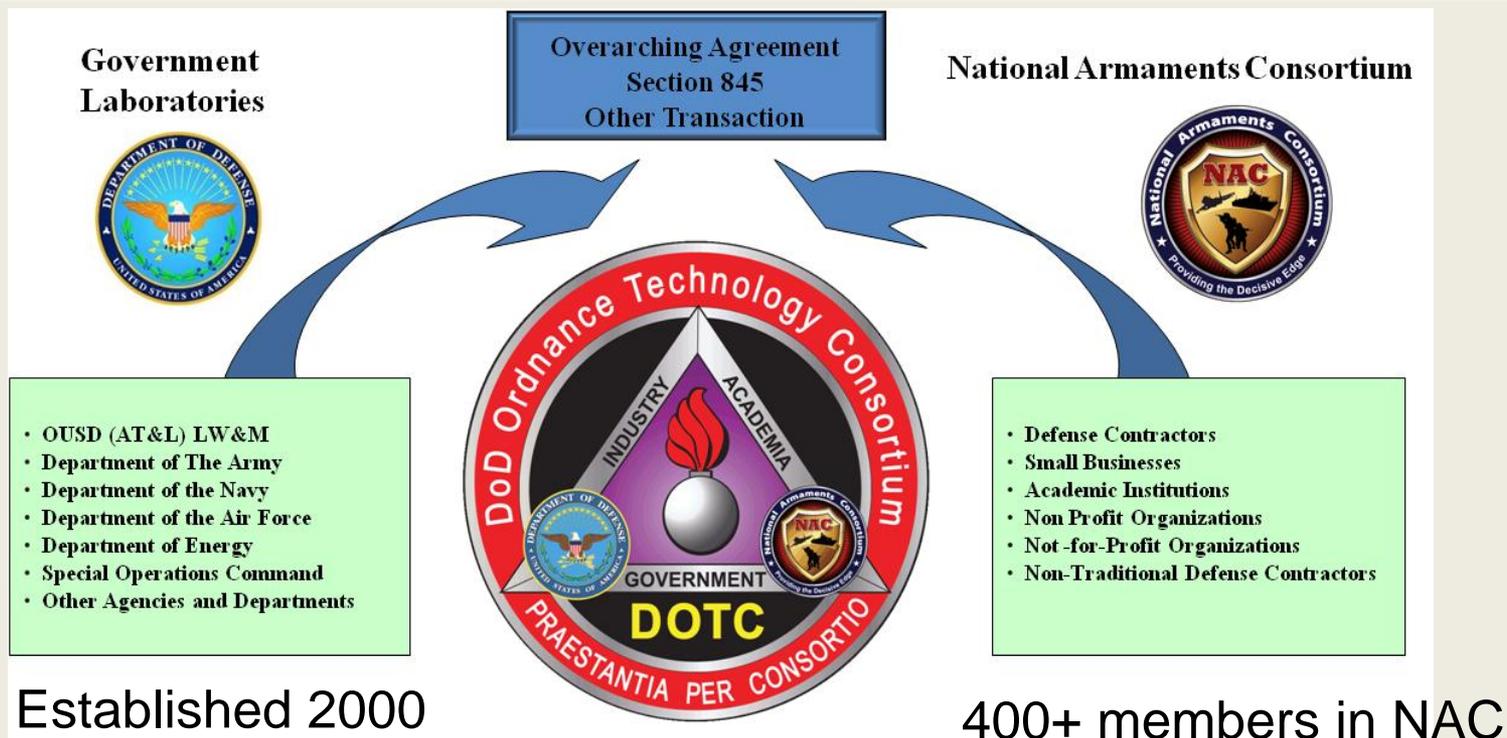
Partnering is a Strategic ARDEC Initiative that is embedded in the ARDEC Culture. ARDEC is continuously expanding its network of Strategic Partnerships with Industry, Academia and Other Government Organizations—both Domestically and Internationally.

**DOD transfers technology to the Industrial Base,  
enabling and speeding transition to the Warfighter**





- Promoting strong partnership with industry/academia
- Other Transaction Agreements (OTA)
- Includes Traditional and non-traditional industries and academia





U.S. ARMY  
**RDECOM**

# STATE-OF-THE-ART FACILITIES



Armament Software Engineering Center



Ballistic Gun Range Complex



Manufacturing Technology Facility



Energetics Synthesis, Formulation and Scale-up Complex



High Performance Propellants Complex



Davidson Warhead Facility



Automated Test Sets Facility



*Our Facilities are a National Asset Available to Private Sector at Low Cost*

Fuze Development Center

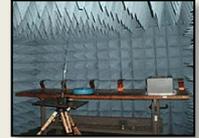


Directed Energy Facility



- Test results are proprietary to the customer; not released outside the government without permission of the customer
- Authority in 10USC2539b

Electromagnetic Effects Complex



Remote Armaments Facility



Soft Catch Gun Facility



DoD Joint Packaging, Handling, Storage, and Transportation Complex



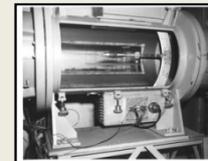
Demilitarization Facility



Drop Tower Facility



Non-Destructive Evaluation Facility



Wind Tunnel Facility



Precision Armaments Complex



## Technology:

- Components developed under SBIR(s)
- System designed under CRADA between Innovative Wireless Technologies and the Acoustics and Networked Sensors group at Picatinny Arsenal
- Multi-modal Unattended Ground Sensor System integrated into enterprise-level mesh network backbone - Ideal for difficult communication environments
- Sensing modalities include seismic, acoustic, PIR, LWIR imager
- Highly scalable, persistent, cost effective deployments with 2+ year operating life on 2 BA-5390 batteries
- Ideal for Infrastructure/Border monitoring; DHS, Border Security

## Development Efforts :



- Addition of Aircraft and Boat classifiers
- Improvements to Human vs. Animal discrimination to further reduce false alarms
- Implementation of SATCOM long haul option

## Payoff:

- Allows for long duration surveillance of remote locations and for perimeter security with minimal maintenance
- System is completely buried except for flexible communications antenna, microphone windscreen, and imager lens, allowing for ease of concealment
- Low cost allows for denser sensor emplacement compared to competitive systems

## Program Status:

- Commercial product



- **Small Business Innovative Research (SBIR)**  
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.....Continued Dialog to Leverage Collaboration Opportunities



# QUESTIONS?

