



# U.S. Army Sustainability Needs NCMS Sustainability Conference June 12, 2012 – Ann Arbor, MI

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Tank Automotive Research Development and Engineering Center

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# Report Documentation Page

Form Approved  
OMB No. 0704-0188

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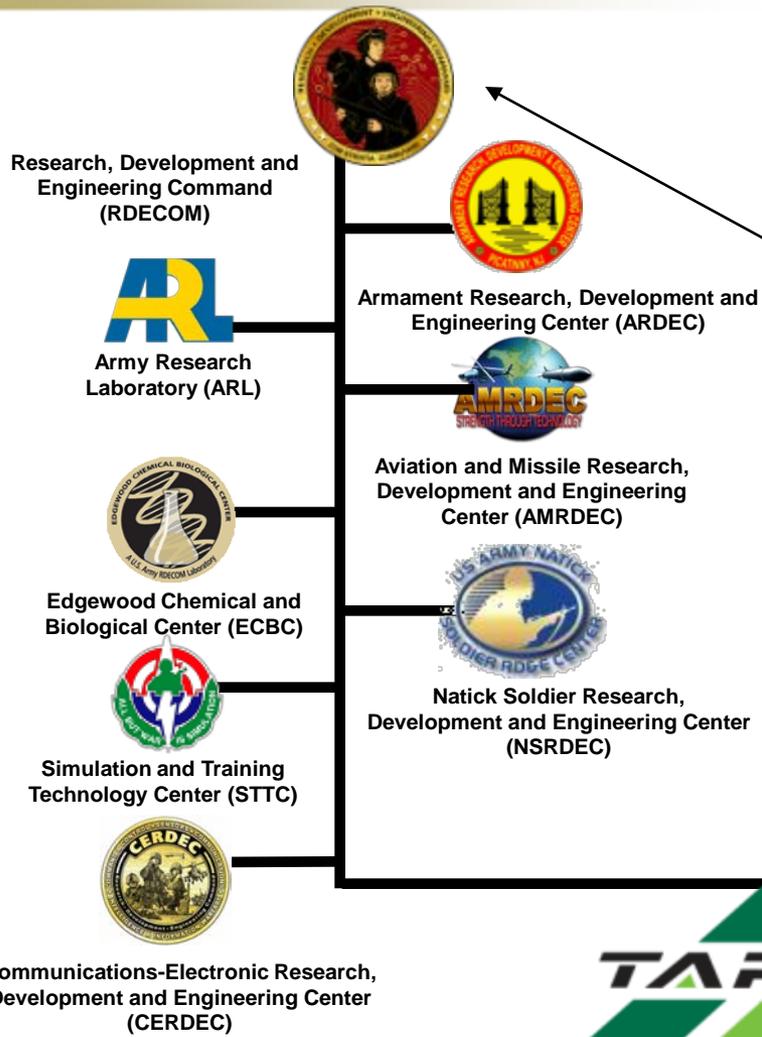
1. REPORT DATE <b>12 JUN 2012</b>		2. REPORT TYPE <b>Briefing Charts</b>		3. DATES COVERED <b>01-06-2012 to 11-06-2012</b>	
4. TITLE AND SUBTITLE <b>U.S. Army Sustainability Needs</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) <b>Richard Gerth</b>				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>U.S. Army TARDEC ,6501 E.11 Mile Rd,Warren,MI,48397-5000</b>				8. PERFORMING ORGANIZATION REPORT NUMBER <b>#23005</b>	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) <b>U.S. Army TARDEC, 6501 E.11 Mile Rd, Warren, MI, 48397-5000</b>				10. SPONSOR/MONITOR'S ACRONYM(S) <b>TARDEC</b>	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) <b>#23005</b>	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>NCMS sustainability roundtable</b>					
14. ABSTRACT <b>-Provides full life-cycle engineering support and is provider-of-first-choice for all DOD ground combat and combat support vehicle systems. -Develops and integrates the right technology solutions to improve Current Force effectiveness and provide superior capabilities for the Future Force.</b>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Public Release</b>	18. NUMBER OF PAGES <b>15</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

- Provides full life-cycle engineering support and is provider-of-first-choice for all DOD ground combat and combat support vehicle systems.
- Develops and integrates the right technology solutions to improve Current Force effectiveness and provide superior capabilities for the Future Force.

*Ground Systems Integrator  
for the Department of Defense*

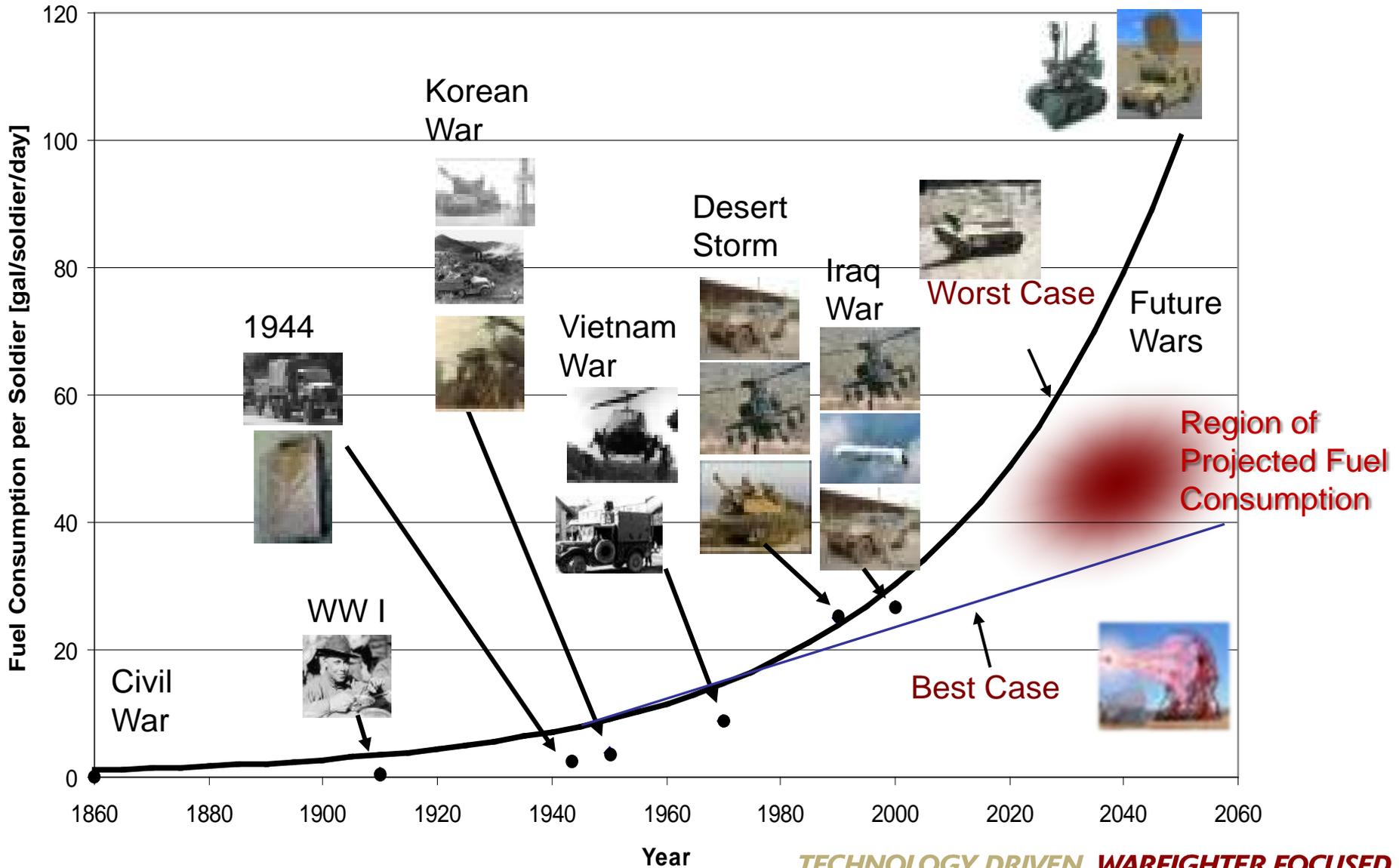


Responsible for Research, Development and Engineering Support to 2,800 Army systems and many of the Army's and DOD's Top Joint Warfighter Development Programs



Reach back to over 8,500 Scientists and Engineers

**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**





**OPERATIONAL ENERGY  
NET ZERO STRATEGY**

**“Grand Challenges”**

- Give Soldiers and leaders capability to manage energy status, resources and performance
- Significantly reduce energy footprint
- Provide flexibility and resiliency by developing alternatives and adaptable capabilities

Power and Energy Strategy White Paper, Army Capabilities Integration Center/Research, Development and Engineering Command /Deputy Chief of Staff, G-4, US Army, 1 April 2010

OSD S&T  
Strategy for  
Power & Energy

Reduce platform energy consumption	Smart energy management	More efficient power sources	Proactive thermal management	Provide energy options
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Army Energy  
Security Goals

Reduce Consumption	Increase Energy Efficiency	Increase Use of Renewable/ Alternative energy	Assured access to sufficient energy supplies	Reduced adverse impacts on the environment
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Army Tact Veh Strategy  
Improve Fuel Economy  
10-15% by 2025

USMC

Reduce the Demand <sup>1</sup>	Increase the efficiency of equipment <sup>1</sup>	Increase the use of renewable energy <sup>2</sup>	Instill an ethos of energy efficiency <sup>1</sup>	Collaborate to drive highly efficient solutions <sup>2</sup>
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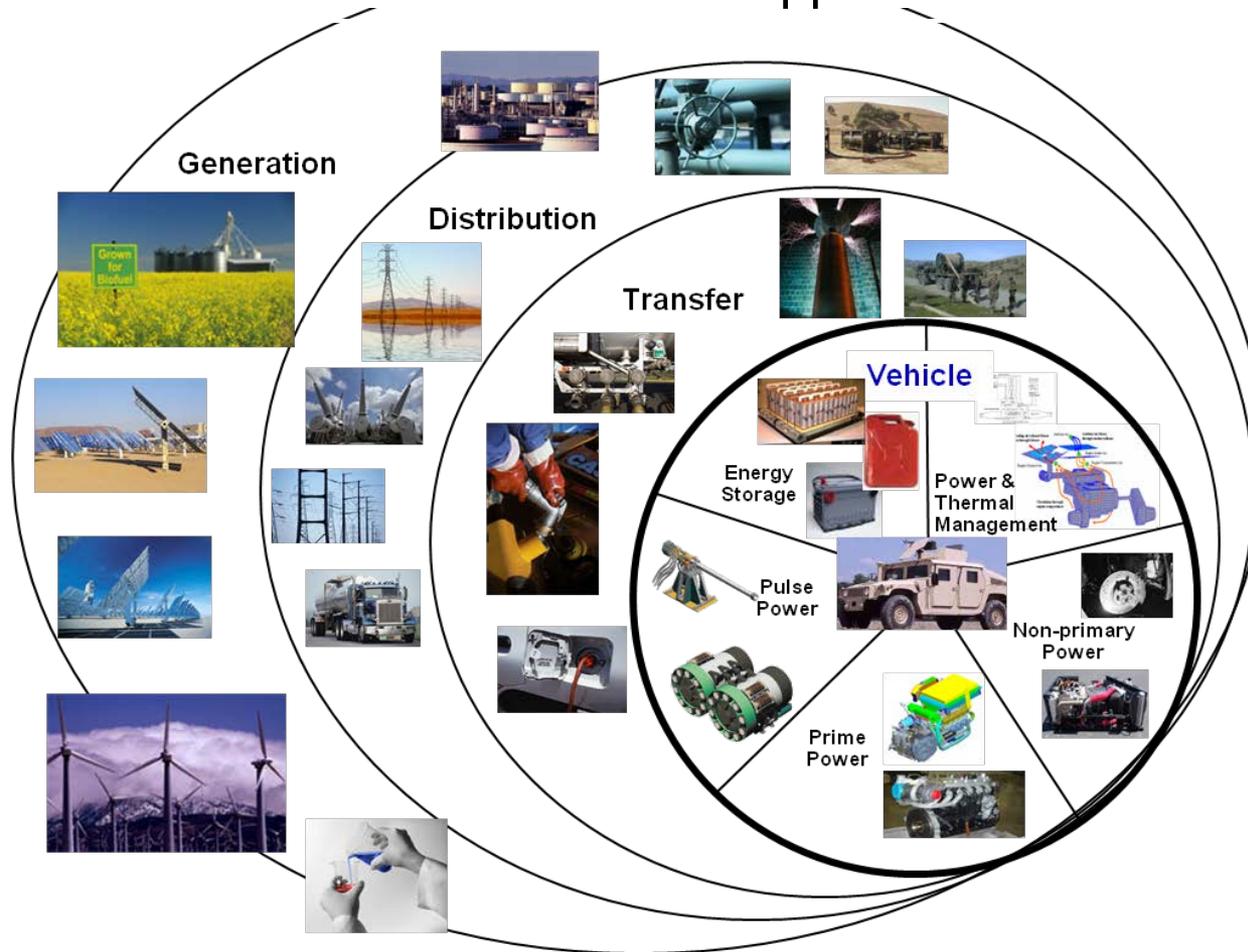
SECNAV Goals  
By 2015 Reduce Petroleum in Commercial Fleet by 50%

SECNAV Goals  
By 2020 Total DON Energy come from alternative sources

1 2010 USMC Commandant Planning Guidance

2 USMC Energy Assessment 2011

## End-to-End Energy Business: From Generation to Application



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## ▶ Tactical Vehicles

Vehicle	Description	Units
<b>Light Tactical Vehicles (LTV)</b>	HMMWV vehicle variants made up of 1 ¼ ton payload class	163,661
<b>Medium Tactical Vehicles (MTV)</b>	14 variants in 2.5 and 5 ton payload class	57,535
<b>Heavy Tactical Vehicles (HTV)</b>	Heavy-duty trucks, 10 ton and up, used for cargo, moving heavy equipment, tractors, tankers, wreckers, fire fighting trucks, dump trucks and others	55,236
<b>Mine Resistant Ambush Protected (MRAP)</b>	A family of armored fighting vehicles designed to survive IED attacks and ambushes	22,600
<b>Total</b>		<b>299,032</b>

## ▶ Non-Tactical Vehicles

Vehicle	Description	Units
<b>Passenger Vehicles</b>	Sedans, station wagons, passenger vans, SUVs	86,138
<b>Light Trucks</b>	Vans, pickup trucks	42,665
<b>Medium Trucks</b>	Miscellaneous cargo, flatbed, boxvan, others	43,762
<b>Trucks</b>	Heavy-duty trucks	17,598
<b>Other</b>	Ambulances, buses and support vehicles	6,633
<b>Total</b>		<b>196,796</b>

- ▶ All tactical vehicles are considered medium or heavy-duty by commercial standards (they are above 10,000 GVW, and all use JP8)
- ▶ About 30 percent of non-tactical vehicles are also medium or heavy-duty
- ▶ In total, about 72% of the total DoD fleet is medium or heavy-duty vehicles



1 in 8  
US Army casualties in Iraq  
was the result of protecting  
fuel convoys.

A 1% fuel  
savings will lead to

6444  
fewer Soldier trips in  
dangerous battlefield  
convoys

*Modeling and Simulation:  
Optimize the System*



*Research and Testing*



*Demonstrate Systems  
and Technologies*



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AGM Battery Failures  
2002-2008

~5%

Incorrect Voltage Output

50%

Damaged - Transport Issues

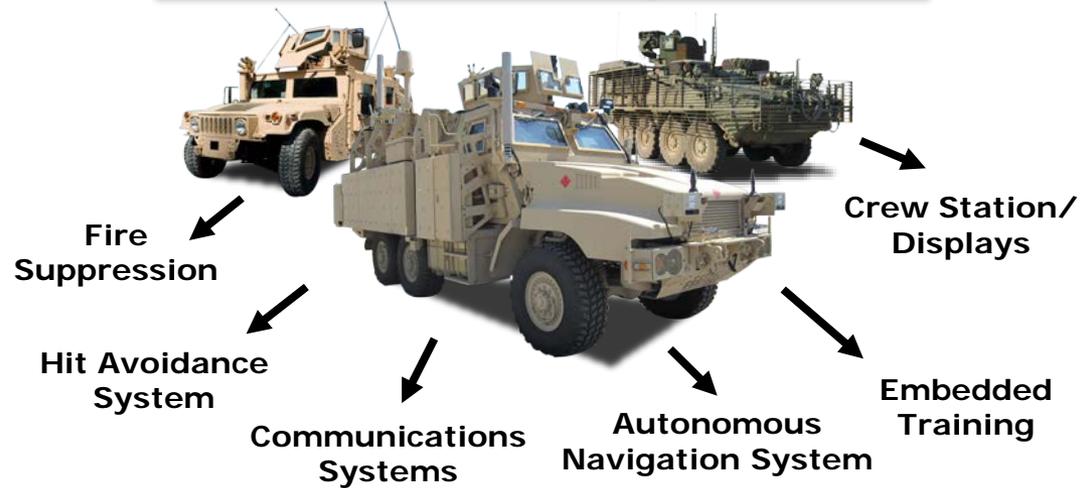
30%

Improper Electrical Performance

20%

Approximately 80% of incorrect voltage failures were serviceable

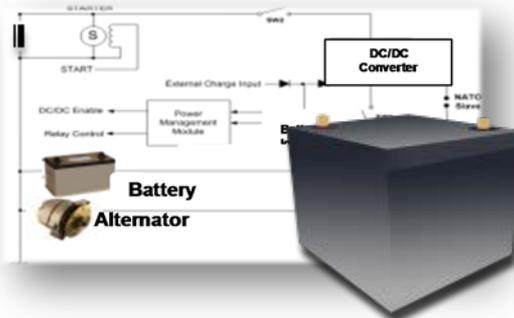
Improved charging techniques can lead to 2X life improvement



## Field Battery Maintenance & Training



## Improved Charging



## Battery Management



- Annual Purchase of Vehicle Batteries: 700,000
- \*\*AGM = Advanced Glass Mat.: "maintenance free"



- Feb 2009 – Hybrid hydrogen vehicles operational in Hawaii
- Nov 2010 – US Army Aloha Microgrid #1 opens
- Jan 2012 – US Army Aloha Microgrid #2 scheduled to be operational

**Integration of micro grids on installations**



**Mobile, bi-directional sources of power**



**Replace petroleum fueled, non-tactical vehicles  
H2ICE/ HFCV**



**Plug-in electric vehicles and bi-directional charging**



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Chartered by Secretary of the Army 21 June 1993



**Mission:** *“The Center will serve as the Army focal point for the development of dual-use automotive technologies and their application to military ground vehicles. It will focus on facilitating joint efforts between industry, government and academia in basic research, collaboration, technology, industrial base development and professional development.”*

**“Leveraging Opportunities to Fill Technology Gaps.”**



# How to Work with TARDEC



## GROUND VEHICLE GATEWAY

U.S. ARMY TANK AUTOMOTIVE RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

<https://tardec.groundvehiclegateway.com>



## Enterprise Market Investigation Process (EMIP) Component Technology Demonstrations

<http://peocscss.tacom.army.mil/EMIP/index.html>



<http://tardec.army.mil/>



<https://www.tacom.army.mil/main/index.html>

CRADA, SBIR, Contracts

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<http://tardec.army.mil/events.aspx>

- **Robotics Rodeo**

20-29 June (Fort Benning, GA)

- **Ground Vehicle Systems Engineering & Technology Symposium (GVSETS)**

14-16 August at Troy Marriot (in conjunction with NDIA)

- **Hybrid, Electric and Advanced Truck Users Forum**

18 - 20 September (Charlotte, N.C.)

- **Society of Automotive Engineers Commercial Vehicle Congress**

2 - 3 October in Rosemont, Illinois

- **AUSA Annual Meeting and Expo**

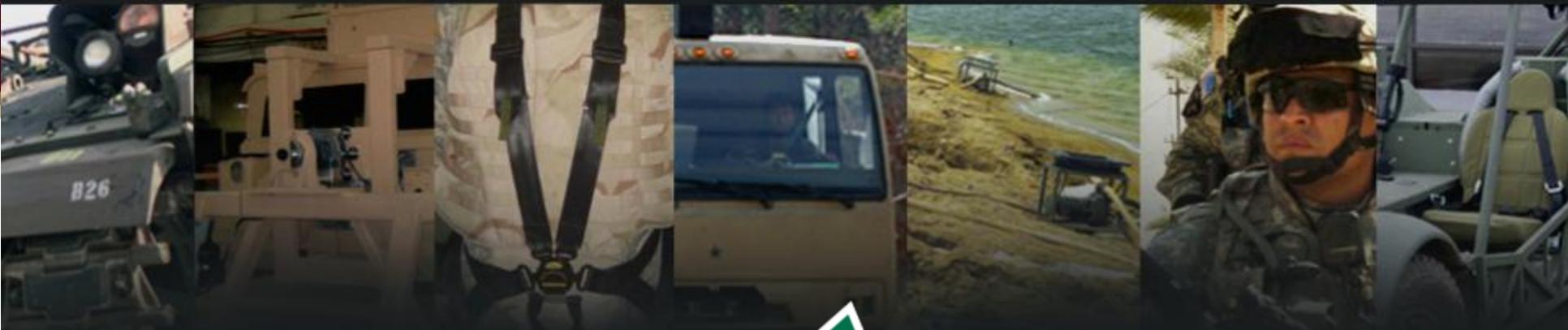
22 - 24 October in Washington DC

- **Dual Use Technology Briefing & How to do Business with Primes**

25 Oct (Flint, MI)

- **TACOM LCMC Advanced Planning Briefs for Industry**

31 Oct – 2 NOV (Warren, MI)



## It's All About the Warfighter

