2009 COMBAT VEHICLES CONFERENCE

"SHAPING TOMORROW'S COMBAT VEHICLE PROGRAMS IN TODAY'S VOLATILITY"

Dearborn, MI

12 - 14 October 2009

Agenda

Tuesday 13 October, 2009

WELCOME REMARKS
- Mr. Mike Viggato, Deputy to the Commander, TACOM LCMC, U.S. Army

KEYNOTE ADDRESS
- LTG Stephen Speakes, Deputy Chief of Staff, G-8, U.S. Army

ACQUISITION KEYNOTE ADDRESS
- Mr. Edward Harrington, Deputy Assistant Secretary of the Army (Procurement), Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology)

KEYNOTE ADDRESS
- LTG Michael Vane, USA, Deputy Commanding General, Futures/Director, Army Capabilities Integration Center

GENERAL SESSION - SESSION II: *"Shaping Tomorrow's Combat Vehicle Programs In Today's Volatility"*
Session Chair:
- Mr. William Taylor, Senior Executive Service Program, Executive Officer, U.S. Marine Corps Land Systems

PANEL DISCUSSION: *"PEO Land Systems & MARCORSYSCOM PMs"*
Panelists:
- Col Brian K. Buckles, USMC, Program Manager, Light Armored Vehicles, U.S. Army TACOM
- LtCol Wendell B. Leimbach Jr., USMC, Program Manager Tank Systems (PG14), Marine Corps Systems Command
- Mr. Bryan Prosser, Program Manager, AAVS (PG14), MARCORSYSCOM

PANEL DISCUSSION: *" PEO & PM Ground Combat Systems"*
Moderator: BG David Ogg, USA, Program Executive Officer Ground Combat Systems, U.S. Army

Wednesday 14 October, 2009

DISCUSSION: *"Combat Vehicle Research and Development"*
- Dr. Grace M. Bochenek, Director, U.S. Army RDECOM-TARDEC
- Dr. Joseph A. Lannon, Director for Armament Research, Development and Engineering Center, U.S. Army Armaments Research, Development and Engineering Center, Picatinny Arsenal, New Jersey

WAR PANEL
Panelists:
- COL John Hort, USA, HBCT Operations
- MSG Brad Kelley, USA, SBCT Operations
- LtCol Scott Leonard, USMC, LAV Operations

GREYBEARD PERSPECTIVE

- GEN William S. Wallace, USA (Ret)

NDIA
National Defense Industrial Association

PROMOTING NATIONAL SECURITY SINCE 1919

2009 COMBAT VEHICLES CONFERENCE

"SHAPING TOMORROW'S COMBAT VEHICLE PROGRAMS IN TODAY'S VOLATILITY"

OCTOBER 12-14, 2009

WWW.NDIA.ORG/MEETINGS/0620

HYATT REGENCY DEARBORN ► DEARBORN, MICHIGAN ► EVENT #0620

SCHEDULE AT A GLANCE

MONDAY, OCTOBER 12, 2009
3:00 PM - 6:30 PM
Registration Open

5:00 PM - 6:30 PM
Welcome Reception
drinks and light hors d'oeuvres provided

TUESDAY, OCTOBER 13, 2009
7:15 AM - 7:00 PM
Registration Open

7:15 AM - 8:15 AM
Continental Breakfast
provided

8:15 AM - 11:30 AM
General Session I
Session Chair:
LTG John S. Caldwell, USA (Ret)
Parametric Technologies
The Spectrum Group
Chairman, Combat Vehicles Division, NDIA

9:30 AM - 10:00 AM
Networking Coffee Break
provided

11:30 AM - 12:30 PM
Lunch
provided

12:30 PM - 5:30 PM
General Session II
Session Chair:
Mr. Roy Perkins
BAE Systems

2:30 PM - 3:00 PM
Afternoon Networking Break
provided

4:30 PM
General Session Ends

4:30 PM - 6:00 PM
Annual Conference Networking Reception
drinks and light hors d'oeuvres provided

MONDAY, OCTOBER 12, 2009

3:00 PM - 6:30 PM — **REGISTRATION OPEN**

5:00 PM - 6:30 PM — **WELCOME RECEPTION**

TUESDAY, OCTOBER 13, 2009

7:15 PM - 7:00 PM — **REGISTRATION OPEN**

7:15 AM - 8:15 AM — **CONTINENTAL BREAKFAST**

8:15 AM - 11:30 AM — **GENERAL SESSION - SESSION I**

"Shaping Tomorrow's Combat Vehicle Programs in Today's Volatility"

Session Chair: **LTG John Caldwell, USA (Ret)**
Parametric Technologies Corporation
The Spectrum Group
Chairman, Combat Vehicles Division, NDIA

8:15 AM — **ADMINISTRATIVE REMARKS**

▸ **LTG John Caldwell, USA (Ret)**
Parametric Technologies Corporation
The Spectrum Group
Chairman, Combat Vehicles Division, NDIA

8:25 AM — **WELCOME REMARKS**

▸ **Mr. Mike Viggato**
Deputy to the Commander, TACOM LCMC, U.S. Army

8:45 AM — **KEYNOTE ADDRESS**

▸ **LTG Stephen Speakes**
Deputy Chief of Staff, G-8, U.S. Army

9:30 AM — **MORNING NETWORKING BREAK**

10:00 AM — **ACQUISITION KEYNOTE ADDRESS**

▸ **Mr. Edward Harrington**
Deputy Assistant Secretary of the Army (Procurement), Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology)

10:45 AM — **KEYNOTE ADDRESS**

▸ **LTG Michael Vane, USA**
Deputy Commanding General, Futures/Director, Army Capabilities Integration Center

11:30 AM - 12:30 PM — **NETWORKING LUNCH**

TUESDAY, OCTOBER 13, 2009 (CONT.)

12:30 PM - 5:30 PM **GENERAL SESSION - SESSION II**

"SHAPING TOMORROW'S COMBAT VEHICLE PROGRAMS IN TODAY'S VOLATILITY"

Session Chair: **Mr. Roy Perkins**
BAE Systems

- **Mr. William Taylor**
  Senior Executive Service Program, Executive Officer, U.S. Marine Corps Land Systems

1:00 PM **PANEL DISCUSSION**

"PEO Land Systems & MARCORSYSCOM PMs"

Moderator: Col Reed T. Bolick, USMC (Ret)
Cypress International

Panelists:

- **Col Brian K. Buckles, USMC**
  Program Manager, Light Armored Vehicles, U.S. Army TACOM
- **LtCol Wendell B. Leimbach Jr., USMC**
  Program Manager Tank Systems (PG14), Marine Corps Systems Command
- **Col Keith M. Moore, USMC**
  Program Manager, Expeditionary Fighting Vehicle
- **Mr. Bryan Prosser**
  Program Manager, AAVS (PG14), MARCORSYSCOM

2:30 PM - 3:00 PM **AFTERNOON NETWORKING BREAK**

3:00 PM **PANEL DISCUSSION**

" PEO & PM Ground Combat Systems"

Moderator: BG David Ogg, USA
Program Executive Officer Ground Combat Systems, U.S. Army

Panelists:

- *Heavy Brigade Combat Team (HBCT)*
  Col Paul R. Lepine, USA, *Field Artillery, Project Manager*
- *Robotic Systems Joint Project Office (RS JPO)*
  LtCol, David C. Thompson, USMC, *Project Manager*
- *Stryker Brigade Combat Team (SBCT)*
  Col Robert W. Schumitz, USA, *Project Manager*

4:30 PM - 6:00 PM **ANNUAL CONFERENCE NETWORKING RECEPTION**

COMBAT VEHICLES DIVISION INFORMATION

Chairman
LTG John S. Caldwell, USA (Ret)
Parametric Technologies Corporation
The Spectrum Group

Steering Committee
Col Reed T. Bolick, USMC (Ret)
Cypress International

Mr. Roy Perkins
BAE Systems

Mr. Chuck Prikopa
BAE Systems

Mr. George Sanchez
General Dynamics, Corp.

WEDNESDAY, OCTOBER 14, 2009

7:00 AM - 12:15 PM
Registration Open

7:00 AM - 8:00 AM
Continental Breakfast
provided

8:00 AM
Administrative Remarks

8:00 AM - 12:15 PM
General Session III
Session Chair:
Mr. Chuck Prikopa
BAE Systems

10:30 AM - 11:00 AM
Morning Break
provided

12:15 PM
Conference Adjourns

WEDNESDAY, OCTOBER 14, 2009

7:00 AM - 12:15 PM — **REGISTRATION OPEN**

7:00 AM - 8:00 AM — **CONTINENTAL BREAKFAST**

8:00 AM - 12:15 PM — **GENERAL SESSION - SESSION III:**

"Shaping Tomorrow's Combat Vehicle Programs in Today's Volatility"

Session Chair: Mr. Chuck Prikopa
BAE Systems

8:00 AM — **ADMINISTRATIVE REMARKS**

- **Mr. Chuck Prikopa**

BAE Systems

8:10 AM — **DISCUSSION**

"Combat Vehicle Research and Development"

- **Dr. Grace M. Bochenek**

Director, U.S. Army RDECOM-TARDEC

- **Dr. Joseph A. Lannon**

Director for Armament Research, Development and Engineering Center, U.S. Army Armaments Research, Development and Engineering Center, Picatinny Arsenal, New Jersey

9:00 AM — **WAR PANEL**

Moderator : MG Julian B. Burns, USA (Ret)
Vice President, Business Development & Marketing, BAE Systems

Panelists:

- **LTC Keith A. Barclay, USA**, *Armor Branch*
- **SFC Brandon Barnett, USA**, *SBCT Operations*
- **COL John Hort, USA**, *HBCT Operations*
- **MSG Brad Kelley, USA**, *SBCT Operations*
- **LtCol Scott Leonard, USMC**, *LAV Operations*

10:30 AM - 11:00 AM — **NETWORKING COFFEE BREAK**

11:00 AM — **GREYBEARD PERSPECTIVE**

- **GEN William S. Wallace, USA (Ret)**

12:00 PM — **CLOSING REMARKS**

LTG John S. Caldwell, USA (Ret)
Parametric Technologies Corporation
The Spectrum Group
Chairman, Combat Vehciles Division, NDIA

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

2009 NDIA Combat Vehicles Conference

U.S. Tank Automotive Research, Development and Engineering Center
Dr. Grace M. Bochenek, Director

Tank Automotive Research, Development & Engineering Center (TARDEC)

- 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

Portfolio

PORTFOLIO

Combat Vehicles

- Heavy Brigade Combat Teams
- Strykers
- MRAPs
- Ground Combat Vehicles (Future)

Force Projection

- Fuel & Water Distribution
- Force Sustainment
- Construction Equipment
- Bridging
- Assured Mobility Systems

Tactical Vehicles

- HMMWVs
- Trailers
- Heavy, Medium and Light Tactical Vehicles

Robotics

- Technology Components
- Demonstrators
- Military Relevant Test & Experimentation
- Transition and Requirements Development

TARDEC Engineers Provide Cradle-To-Grave Engineering Support

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Technology Thrust Areas

Ground Vehicle Power & Mobility

- Prime Power (Powertrain)
- Non Primary Power
- Power & Thermal Management
- Energy Storage
- Track & Suspension
- Alternative Energy

Ground Systems Survivability

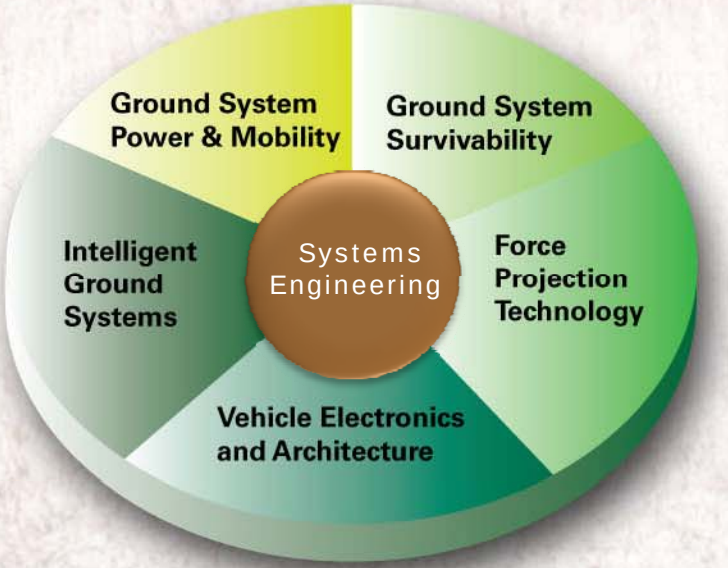
- Integrated Vehicle Protection Systems
- Active Defense
- Signature Management
- Laser Vision Protection
- Ballistic Protection
- Crew Survivability

Force Projection Technology

- Water Generation, Purification, Storage, Distribution & Quality Surveillance (QS)
- Petroleum Storage, Distribution & QS
- Material Handling Equipment
- Petroleum, Oils & Lubricants Technology
- Mechanical Countermine Equipment
- Tactical Bridging
- Alternative Fuels

Intelligent Ground Systems

- Autonomous Robotics Systems
- Safe Operations Technologies
- Indirect Vision Technologies
- Unmanned Systems Technology Development
- 360°Situational Awareness Technologies
- Soldier Machine Interfaces
- Connected Vehicles



Vehicle Electronics & Architecture

- Electronics Integration
- Data Architecture
- Condition-Based Maintenance (CBM+)
- Power Architecture/Management

Challenges, Facts & Goals

- **<u>Balance</u> Long-term technology investments & Short term Quick Reaction Solutions**
  - Think Incremental
  - Drive Innovation

- **Build the technology, but don't forget to build the business case**
  - Develop supporting physics-based models, analytical tools to support analysis, and system level studies……..Support the Army's DECISION MAKING process.
  - It's also about building a community of technical competence, both Industry & Government
  - Infuse LSS into Technology Management efforts

- **R&D Dollars are precious….use them wisely**

- **TARDEC leverages and aligns academia, industry, and government R&D to collectively meet Army's and our Nations needs**

- **TARDEC is committed to supporting the warfighter**

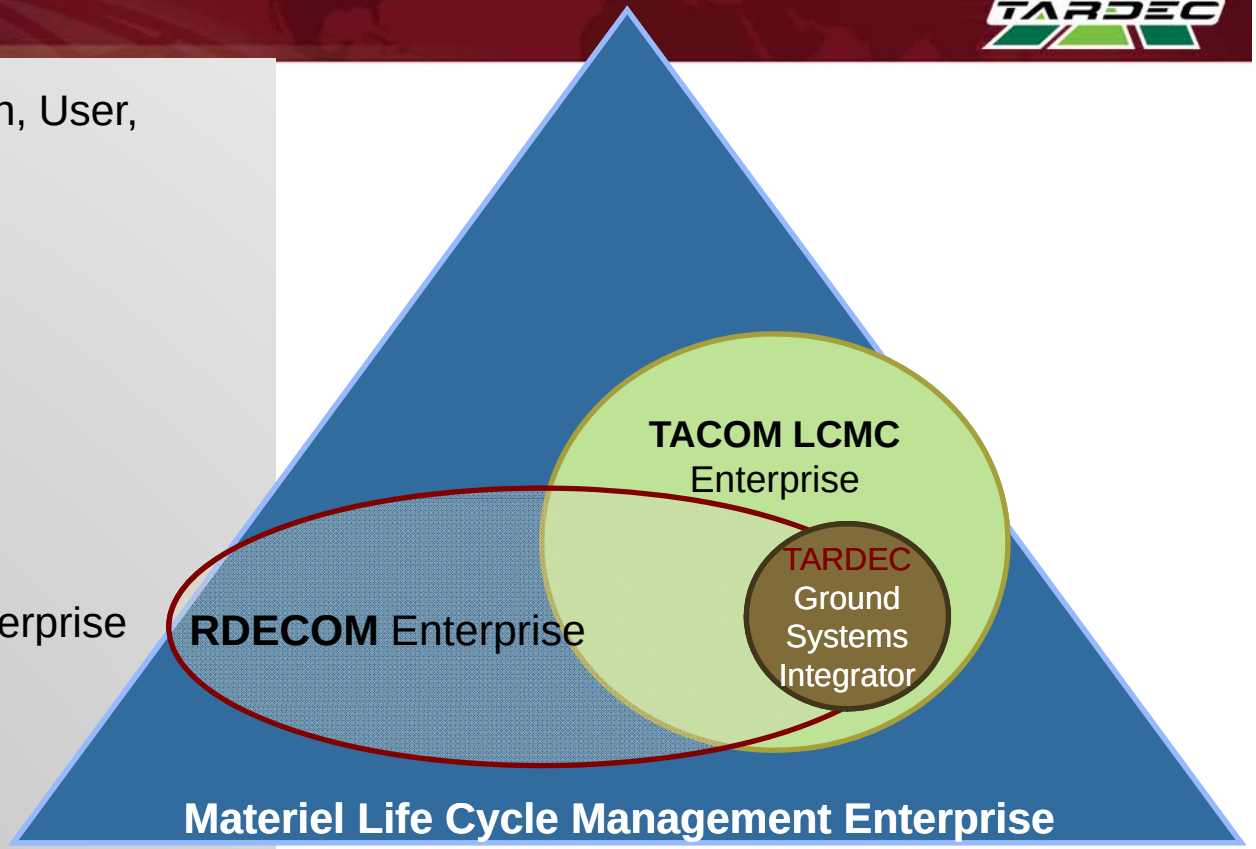
Army Materiel Enterprise

- Align Ground Systems Acquisition, User, S&T and Logistics communities.
  - Stakeholders include:
    - PEOs
    - PMs
    - TACOM ILSC
    - Marine Corps
    - TRADOC
    - RDECOM

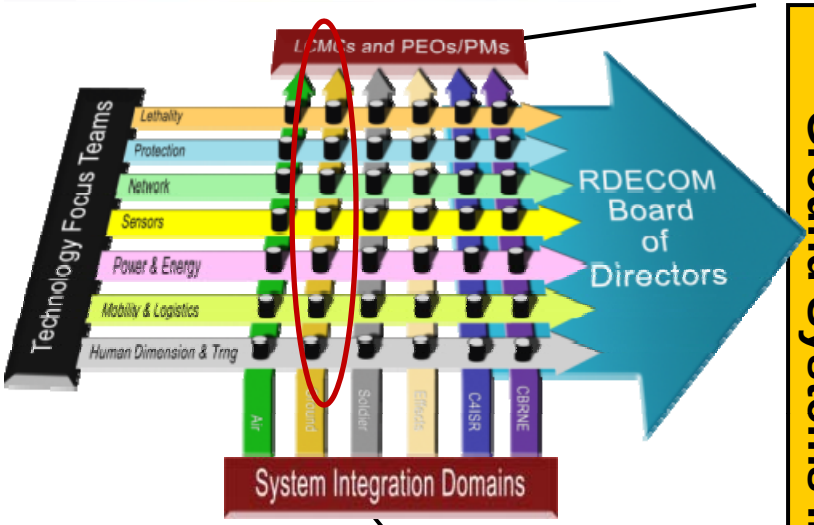
- Facilitate across the Materiel Enterprise
  - technology *planning*,
  - *development*,
  - *transition*

- Integrate S&T and acquisition program cost, schedule and performance parameters.

- Manage capability development strategies that links 6.1, 6.2 and 6.3 technology programs into cohesive integrated plans



RDECOM Ground Systems Integration Domain



Ground Systems Integration Domain

Mission Tasks:

- Data Refinement with TRADOC and LCMC Partners
- Translation of data into actionable research
- Understand & manage portfolios with TFTs/SIDs
- Shape POM with LCMC Partners
- Facilitate integration and transition of S&T to soldier

Ground Systems Portfolio:

- Combat Vehicles
  - Heavy Brigade
  - Stryker
  - Robotic Systems
  - MRAP
- Tactical Vehicles
  - HMMWVs
  - Trailers
  - FMTV
  - HTV
- Ground Combat Vehicle
- Joint Combat Support Systems
  - JLTV
  - Test/Measurement/Tools Equipment
- Force Projection
  - Fuel & Water Distribution
  - Force Sustainment
  - Construction Equipment
  - Bridging
  - Assured Mobility Systems

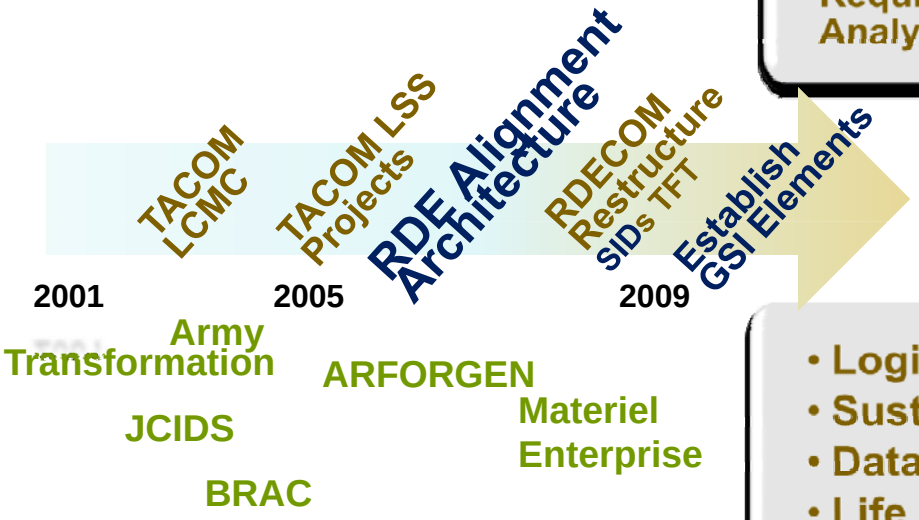
Partners

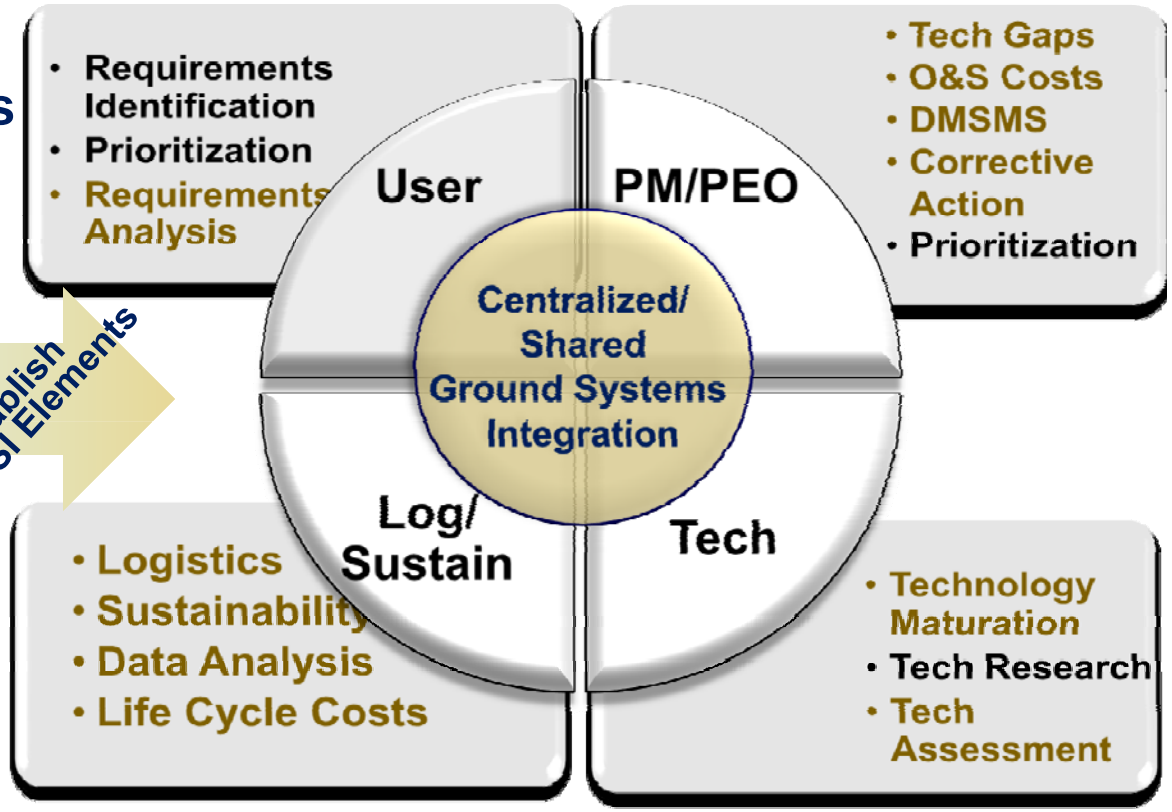
- **PEO GCS**
- **PEO CS/CSS**
- **PEO Integration**
- **TACOM ILSC**
- **TRADOC**
- **Marine Corps**

Technology Integration Across Ground Domain

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

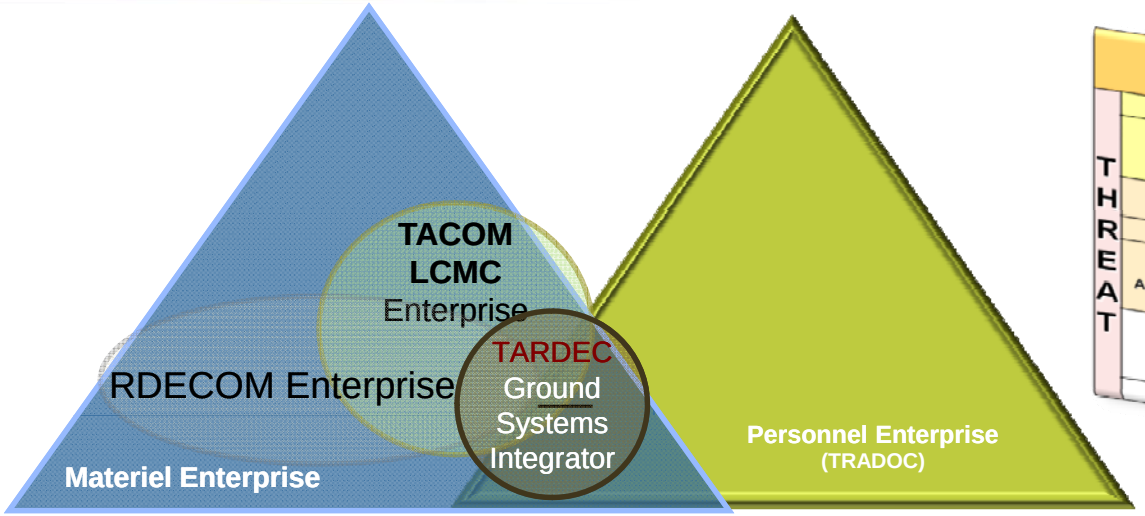
Building the Ground Systems Enterprise

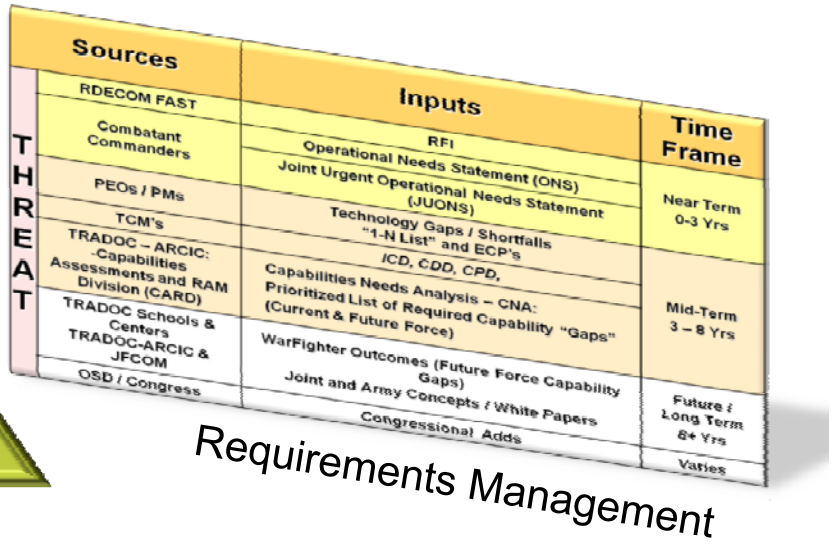




Not part of Systems Integration
Requires Systems Integration

Warfighter Integration





Recent TRADOC Activities Supported by Ground Systems Integration (GSI)

- GCV
  - 120 Day GCV CDD
  - Technology Assessment of the requirements
  - Analysis of Alternatives support
  - Specification development
  - Concept excursions
- EM Gun
- III Corp
- Robotics Innovation Workshop
- Power & Energy Workshop
- Robotics Rodeo

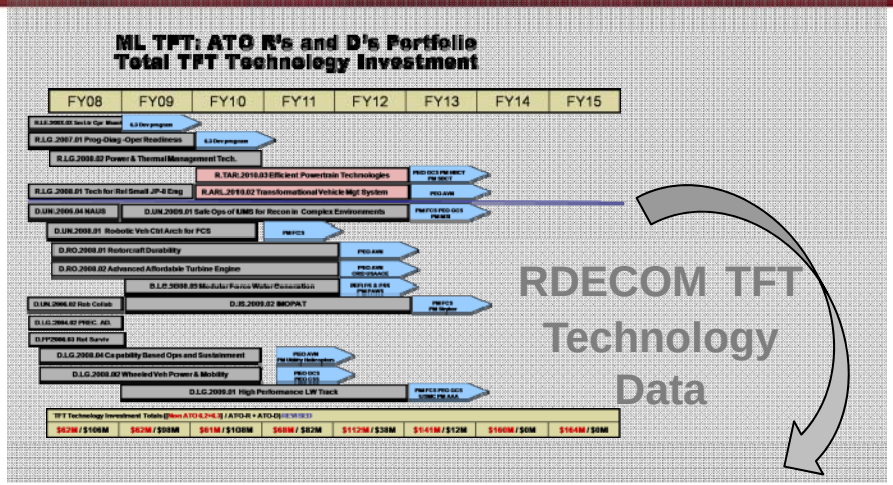
Long Term Goal

- Establish Robust GSI Requirements-Materiel development Process between Enterprises

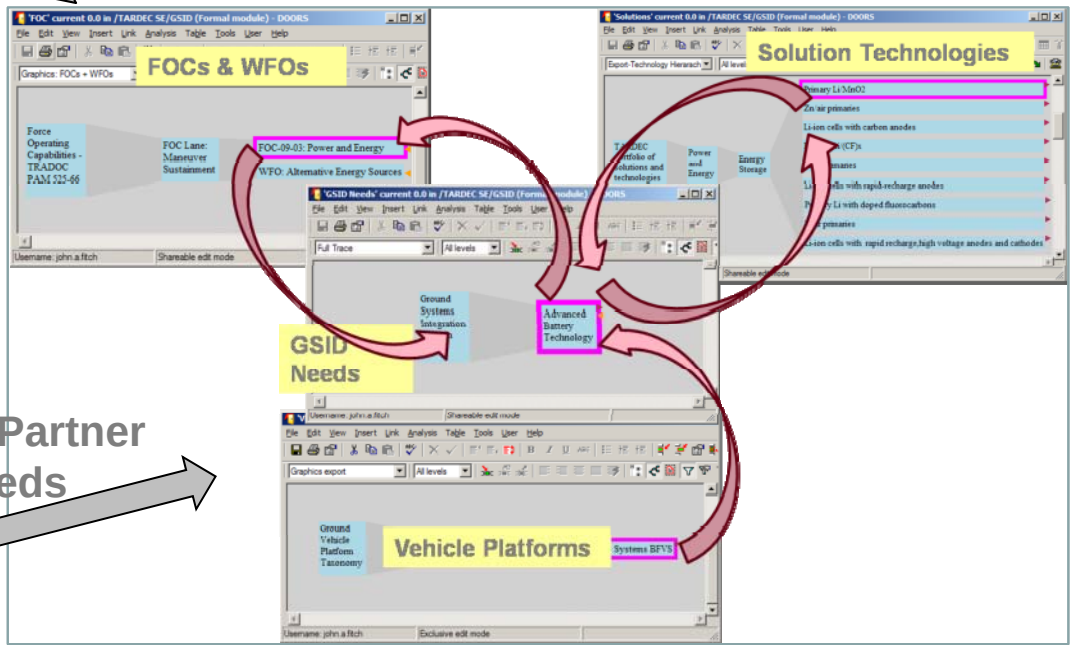
Linking Warfighter and Technology through Systems Engineering

- The GSID is Steward of 30 FY10 WFOs (129 Total)

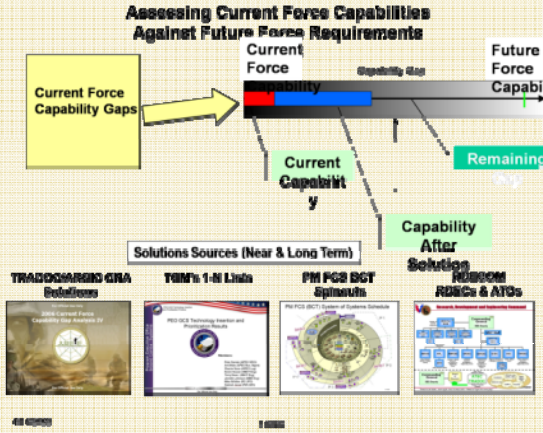
TRADOC ARCIC



RDECOM TFT Technology Data

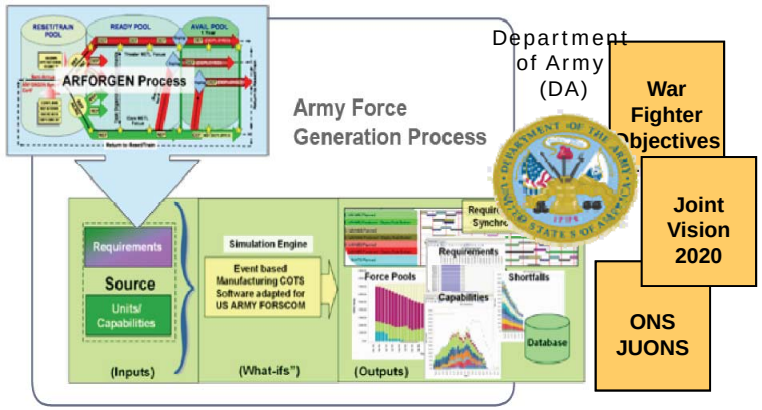


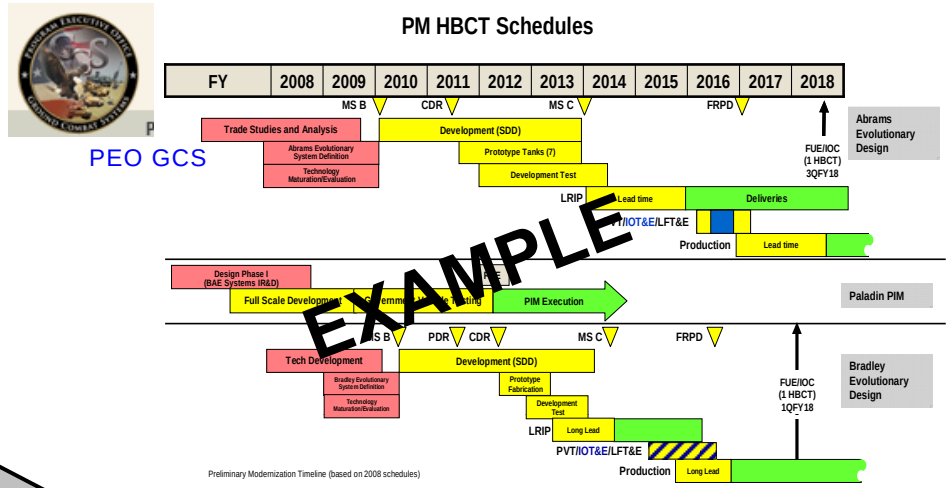
Example – PEO GCS

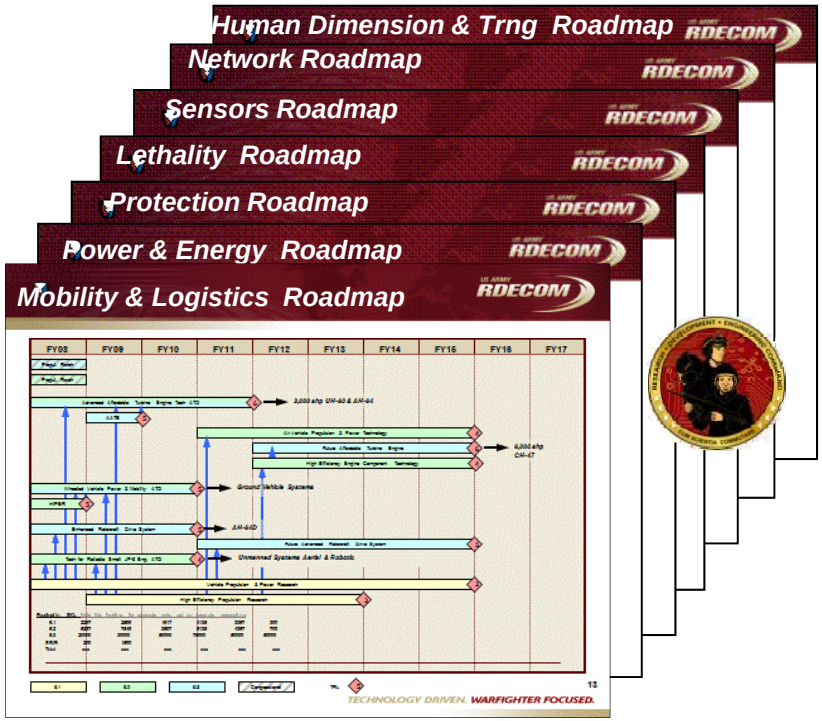


LCMC Partner Needs

Ground Systems Integration
Synchronization of Data



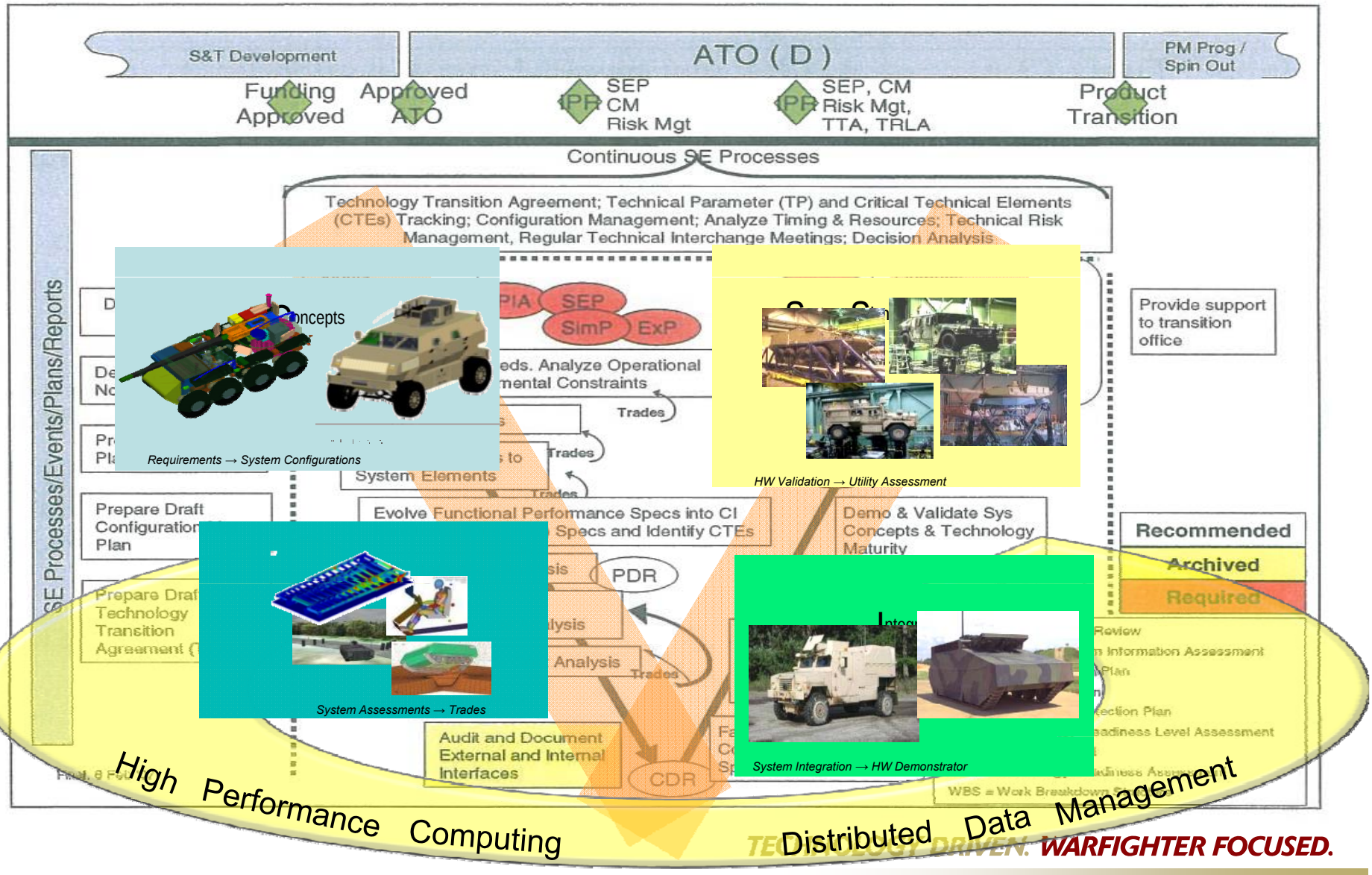




Ground Systems Integration Domain
Synchronized Views
- Capability Based
- Time Opportunity Based
- Resource Based

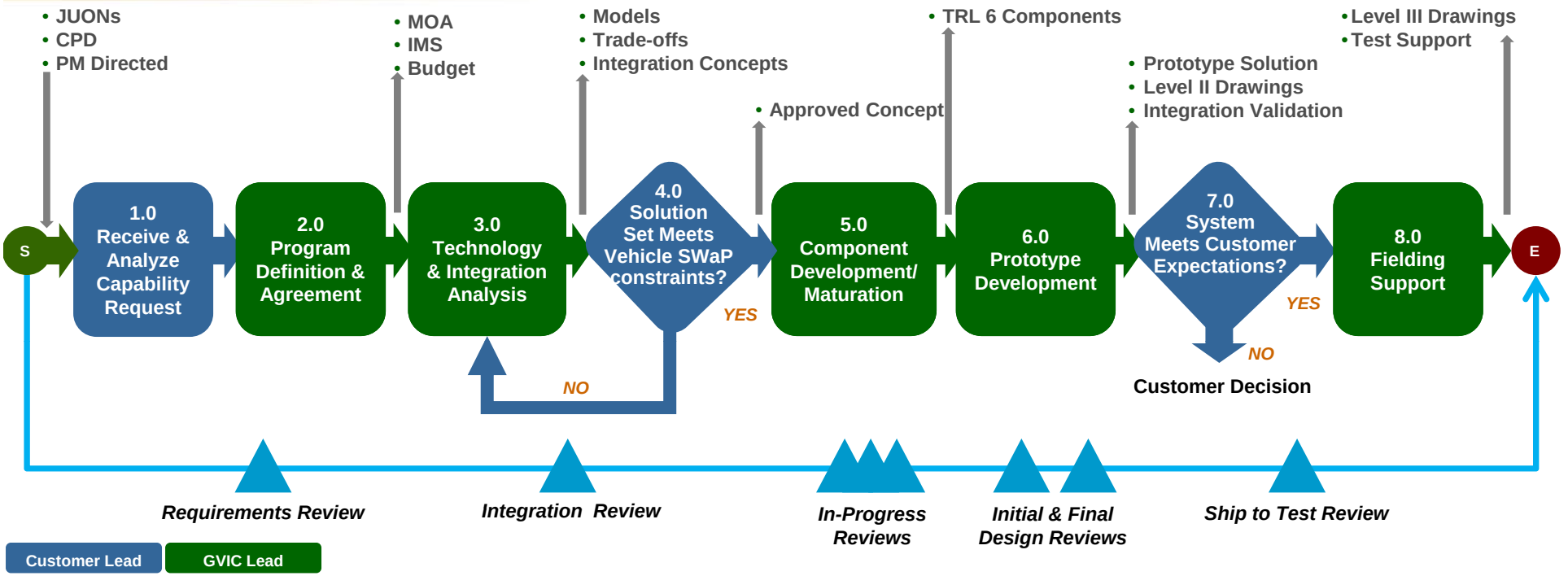
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Concepts, Analysis, Systems Simulation, Integration (CASSI)



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Systems Engineering Excellence



Systems Engineering PEOPLE

- Ground Vehicle Integration Center (GVIC)
- Systems Engineering Team
- Concepts, Analysis, Systems Simulation and Integration (CASSI)
- Subject Matter Experts

Systems Engineering PROCESSES

- Life Cycle Data Management
- Quality Assurance
- Testing
- Planning and Portfolio Management
- Project development and Execution

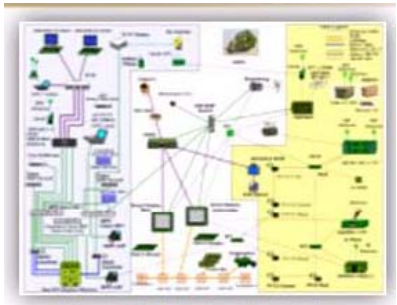
Systems Engineering PRODUCTS

- Proof of Concept
- Scope of Work
- Risk Reductions
- Technology Solutions
- Corrective Actions
- Decision Data

Ground Vehicle Integration Center

Description

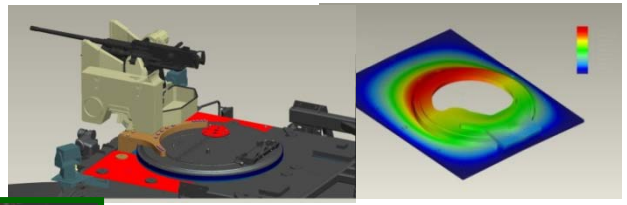
- Leverages RDECOM and DoD capabilities in a repeatable process to apply rigorous systems engineering to ground systems integration
- Provides customer partners a single entry point for cost, schedule, performance and risk management of system integration projects



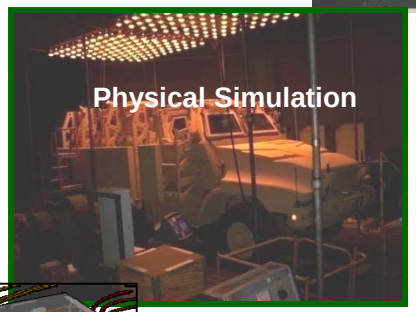
Updated Architecture

2009 Top Accomplishments

- Accelerated Remote Weapon Station Integration with ARDEC for the Caiman, MaxxPro and RG-33 systems
- Completed Full Capability Insertion Integration for Caiman Systems



Employs TARDEC organic Concepts, Analysis, Systems Simulation and Integration (CASSI), System Engineering (SE), Prototype Integration Facility and significant contributions from other RDECs and Organizations



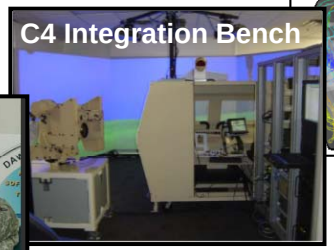
Physical Simulation

GVIC Projects (active):

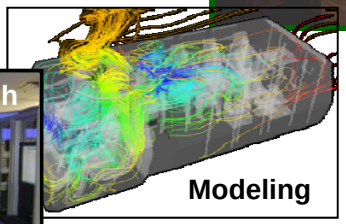
- *MRAP Capability Insertion*
- *C2OTM* – MRAP*
- *C2OTM* – Stryker*
- *LAV-R Upgrade*
- *RS-JPO*

*Command & Control On The Move

User Jury



C4 Integration Bench



Modeling

MRAP Capability Insertion

- **Vanguard** (ARDEC)
  - —CROWS II RWS (ARDEC)
  - —Boomerang **(**ARDEC)
  - —Double Shot **(**ARDEC)
- **OGPK Overhead Protection** (ARDEC effort)
- **LRAS3**
- **Check 6 Camera**
- **Overhead Wire Mitigation**
- **IBIS TEK Lights**
- **RPG Protection**
- ***Power Upgrade (derived requirement)***
- ***C4I Architecture (derived requirement)***
- **Thrown Object Protection System**

GVIC is the System Integration Lead for the MRAP Joint Program Management Office

TECHNOLOGY DRIVEN. ***WARFIGHTER FOCUSED.***

Systems Integration Applied in Survivability Technology Development

It's about balancing integration, mission, threat & technology

Requirements

Industry

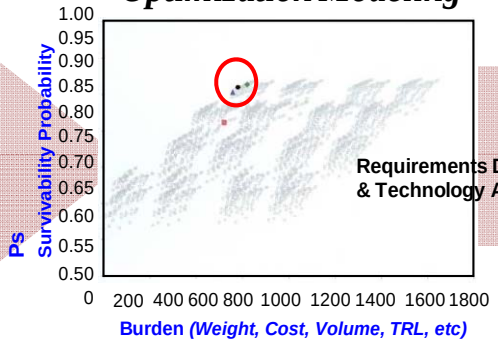
Labs

RDECs

OGAs

Survivability Technology Pallet

Optimization Modeling



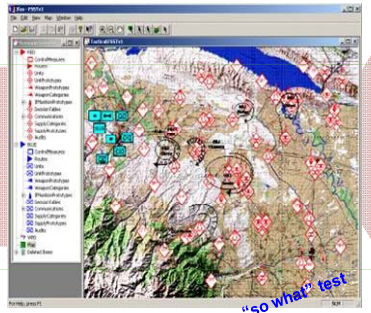
Requirements Definition/Decomposition & Technology Assessment

Vehicle Integration & Design Studies (SWAP-C)

Performance, Payload & Protection

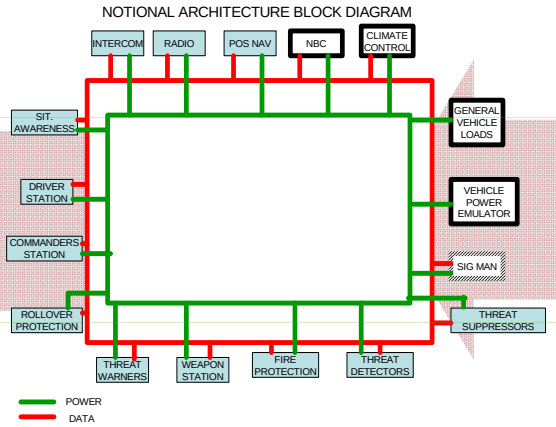
- Armor
- Weight
- Mobility (Veh Dynamics)
- Powertrain
- Thermal (HVAC)
- Safety (Crashworthiness)
- Cost
- Op. Effectiveness
- Mine Blast
- Sig Man
- Vulnerability
- Criticality

1st Order OE



The "so what" test

Integrated Product



System Integration Lab (SIL)

Technology Challenges

- Enduring Technology Challenges
  - Size
  - Weight
  - Power & Energy
  - Cooling

- Today's Challenges
  - Balance Long-term technology investments & Short term Quick Reaction Solutions
  - Threat is escalating and evolving
  - Incremental approach – Good enough but needs to have capability grow to meet full requirement
  - System interdependency (Armor, Power, C4I, weight)

Summary

Ground Systems Integration

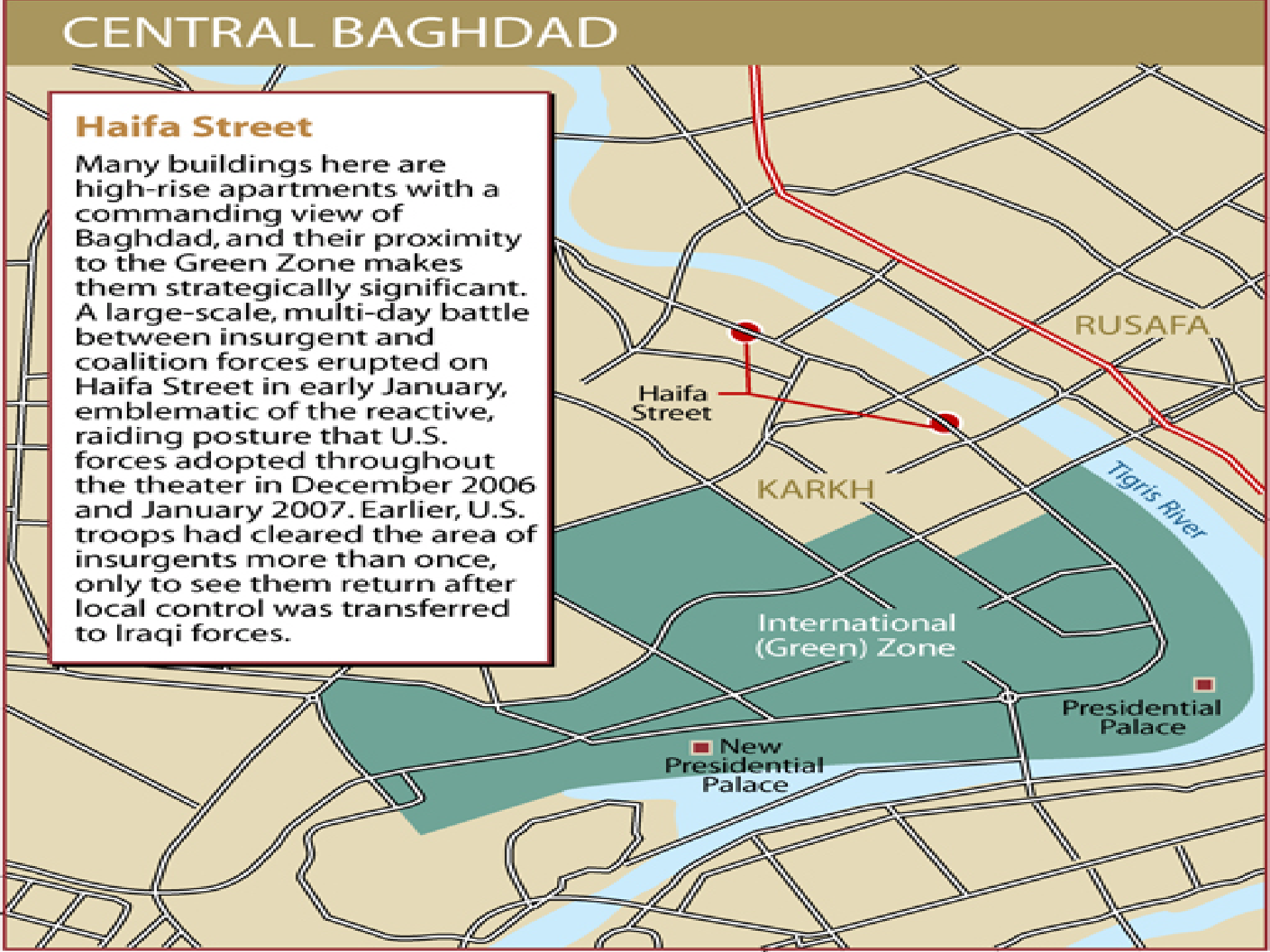
- Creates a large opportunity to be a “game-changer” in the alignment of S&T, Acquisition and Logistics
- Is a complex and interdependent effort and continues to receive commitment from all stakeholders
- Requires a deliberate approach, utilizing collaborative planning, to execute successfully
- Faces Technical and Process Challenges

9 January 2007

Haifa Street, Baghdad, Iraq

Background

B co 1-23 Inf, 3-2 SBCT was notified at 2200 hours local time to provide reinforcement to elements of the Iraqi Army operating in the area north of the International Zone known as Haifa Street. The Iraqi Army secured a high rise building along Haifa Street and was defending themselves but was running low on ammo and unable to communicate with its own headquarters for reinforcements. Enemy threat was estimated at a platoon size element with light machine guns, hand grenades and RPG's.


CENTRAL BAGHDAD
Haifa Street
Many buildings here are high-rise apartments with a commanding view of Baghdad, and their proximity to the Green Zone makes them strategically significant. A large-scale, multi-day battle between insurgent and coalition forces erupted on Haifa Street in early January, emblematic of the reactive, raiding posture that U.S. forces adopted throughout the theater in December 2006 and January 2007. Earlier, U.S. troops had cleared the area of insurgents more than once, only to see them return after local control was transferred to Iraqi forces.
RUSAFA
Haifa Street
KARKH
Tigris River
International (Green) Zone
Presidential Palace
New Presidential Palace

Sequence of Events

B co's commander used received the battalion frago at the Battalion HQ's and then moved directly to his Stryker. At the same time the rest of the company was assembling in the motor pool conducting PCI's and preparing to conduct a movement to contact. The commander issued his frago via FM in the motor pool and sent out the route via FBCB2 overlay. He finished and sent out a company level order to his platoon leaders while moving to the Iraqi Army elements. This all occurred within a 30 minute period. Without FBCB2 our company would not have been able to move out as quickly to reinforce the Iraqi Army. The commander was unfamiliar with the area and chose to take two routes into Haifa Square, one element was used to cordon the high speed avenues of approach and the other was used to go directly to the link up point with the Iraqi Army.

Contact Cordon Element

The cordon element made contact first with a small element of dismounted enemy combatants with AK-47's, the cordon stays mounted and returned fire from their air sentry hatches while they moved into covered positions. Once in their positions squad leaders assigned sectors of fire to the vehicle commanders for their vehicles Remote Weapons Stations. Squad Leaders and Vehicle Commanders maintained SA of the main element via the FBCB2. The dismounted nine man infantry squads stayed mounted within the protective armor of the Stryker.

Contact Main Element

The main elements made it to the link up point just after the cordon element established its positions. All leaders in the main element knew the location of the cordon element via FBCB2. The main element was then engaged from elevated positions by enemy forces with machine gun fire, RPG's and hand grenades being thrown from roof tops. Utilizing Remote Weapons Stations with .50 cal MG and soldiers in air sentry hatches firing M-4s and M249s the main element was able to gain fire superiority and force the enemy to retreat after 10 to 15 minutes of sustained fire. The commander then extended the company cordon with his Strykers and established a secure perimeter. B co finally linked up with the Iraqi Army and began the treatment and evacuation of Iraqi Army dead and wounded.

Lessons Learned

- Systems like FBCB2 aid units in not only Situational Awareness but mission planning, rehearsal and command and control

- There is no common communications platform for US forces and its allies

- Armor packages such as Slat Armor and the Common Ballistic Shield give soldiers confidence in their vehicle

- Air sentry hatches enable soldiers a protected platform to effectively engaging enemy forces during movement or while halted.

- Sniper net solution worked well during the day, I had to cut through the netting so I could see to engage elevated targets at night

Marine Corps Light Armored Vehicles

NDIA Combat Vehicles Conference

12 Oct 2009

Col. Brian K. Buckles
Program Manager
Light Armored Vehicles

brian.buckles@us.army.mil
(586) 574-9006

"Making the Transition to the Future"

PM LAV

➢**PM LAV Mission** - Research, development, acquisition and life cycle support for USMC Light Armored Vehicle family of vehicles.

➢**Our Location** – MARCORSYSCOM program office supported by TACOM in Warren, Michigan

– **LAV – in the Light Armored Reconnaissance Battalion**.
  - Conduct reconnaissance, security, and economy-of-force operations, limited offensive or delaying operations that exploit the unit's mobility and firepower.
  - Eight-wheeled armored combat vehicle with a 25-year history to remain in service until to 2025 and possibly beyond.

– **MPC – will reside in the Amphibious Assault Battalion**.
  - Provide armor-protected mobility for infantry battalion maneuver task forces. 2 MPCs will lift a reinforced rifle squad.
  - The MPC program balances vehicle performance, protection, and payload attributes.

"Making the Transition to the Future"

LAV Modernization Plans

Funded Programs

- LAV-C2 Upgrade - Moving towards Milestone-C.
- LAV-AT Upgrade - Moving towards Milestone-B.
- OIF Upgrades, A2 Upgrade, LAV Re-Procurement- Fielding.
- LAV Survivability Upgrades - Part II

Future LAV Projects (FY10-11)

- LAV Rapid Acquisitions & Modifications (RAM)
- LAV Fleet Sustainment Upgrades – EPLS
- LAV-R Upgrades (Crane, Winch, Generator)

Past RAM Projects

ALL PROJECTS COME OUT THROUGH:

Federal Business Opportunities

www.FedBizOpps.gov

"Making the Transition to the Future"

LAV Survivability Upgrade – Part II

- **Incorporate *Floor Spall Liner***
- ***Protection or Relocation of Fuel Tank***
- **Incorporate *Mine Blast Resistant Seating* where possible**
  - LAV-25
    - VC and Gunner
    - Scouts
  - Mission Role Vehicles
    - VC and staff locations
  - Driver cannot be suspended but will need a reinforced seat and leg protection

LAV - Summary

- **USMC LAV projected to remain** *in service until 2025*

- **LAV family of vehicles must remain:**
  - ***Effective*** in the face of increasing threat capabilities
  - ***Supportable*** in the face of increasing age (CBM+ & Obsolescence are growing issues)

- **The challenge:** *How much survivability, lethality and mobility can be packed into an air-transportable, swim-capable LAV?*

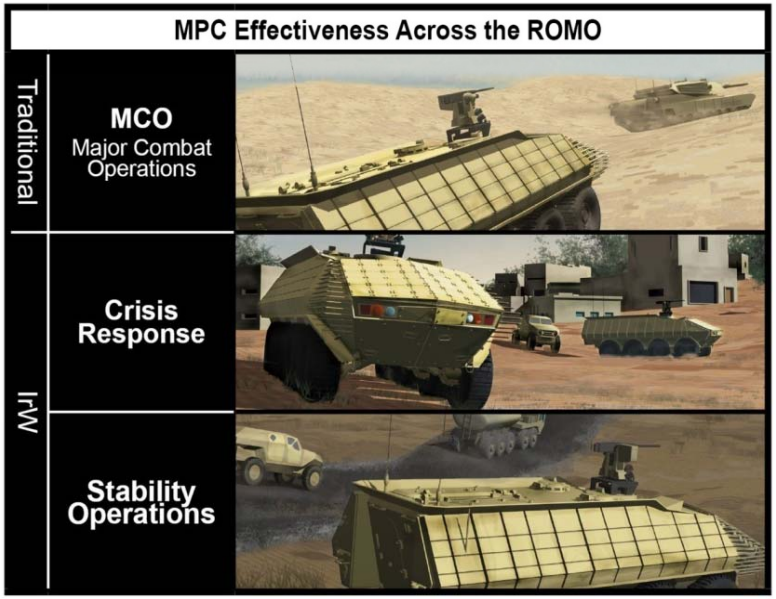
- **Near Future:**
  - **LAV RAM projects**
  - **LAV Survivability Upgrades**
  - **LAV Sustainment Upgrades**

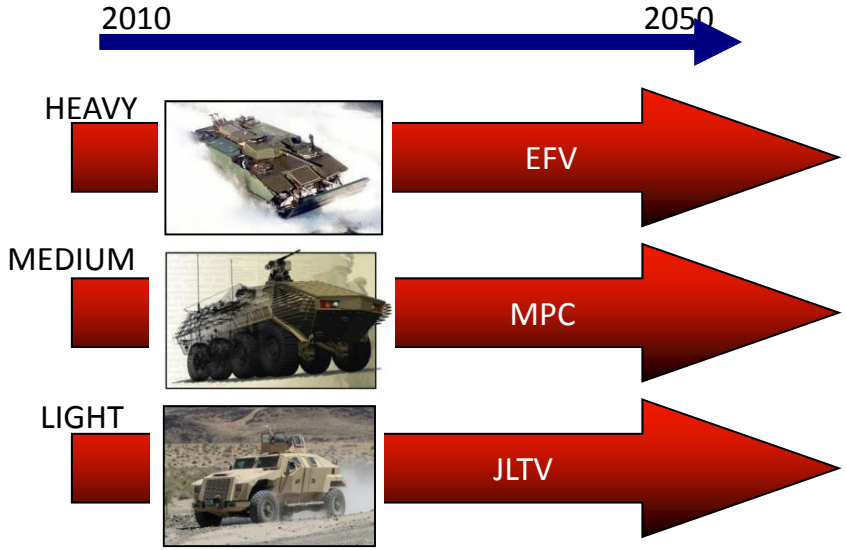
Marine Personnel Carrier (MPC)

"Making the Transition to the Future"

Where Does the MPC Fit?

Marine Corps future triad of tactical mobility





- The MPC, as the medium capability category platform, provides a bridge in capability between the EFV and JLTV and a balance between the performance, protection and payload attributes.
- The MPC is an expeditionary armored personnel carrier - ideal for irregular warfare - yet effective across the full range of military operations, providing armor-protected mobility for infantry battalion maneuver task forces.
- The MPC family of vehicles includes the baseline Personnel Carrier and two supporting mission role variants: a Command & Control variant and a Recovery & Maintenance variant.

"Making the Transition to the Future"

Marine Personnel Carrier (MPC)
Pre-MS A: The Near Future…

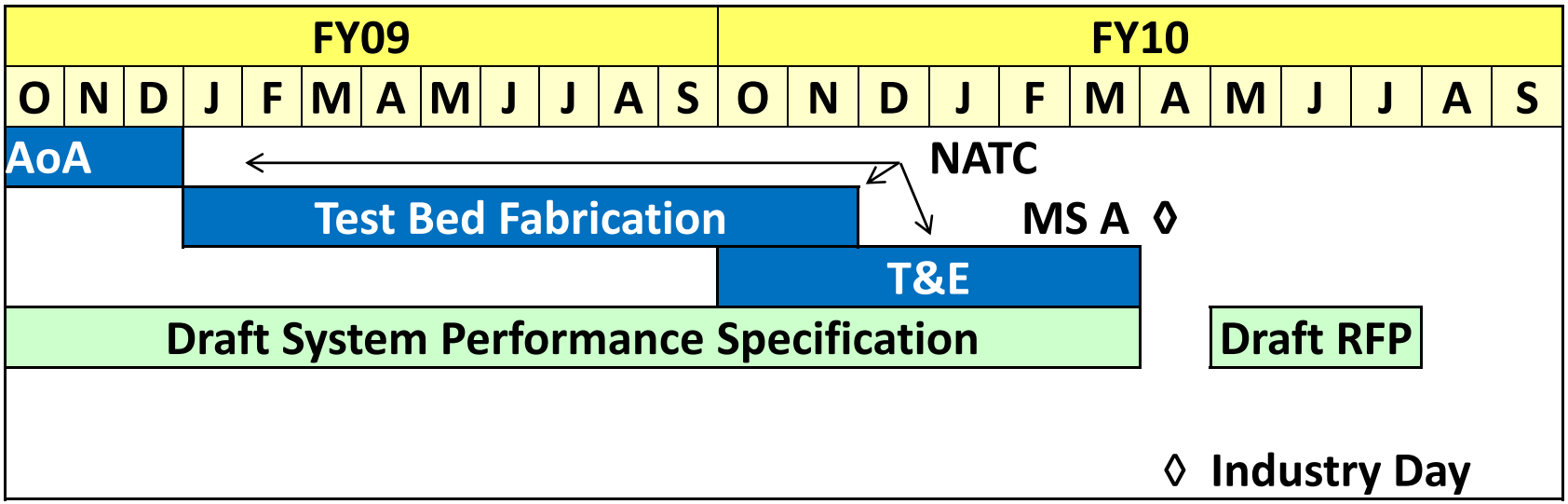
- **Currently working with ONR to mature technologies that need to be integrated on the MPC**
  - ***Advance Lightweight Armor*** Materials/ Technologies
  - ***Advanced Seat Technology*** for blast resistance, shock mitigation and roll-over protection
  - ***Active Protection System***
  - On-Board Vehicle Power for ***exportable power***
  - ***Fuel Efficiency*** & Battlefield Power
  - ***Advanced Suspension***
  - ***TBD***

Technology Demonstrator Vehicle

The MPC technology demonstrator vehicle will address:

- **Mobility** (Powerpack, drivetrain, suspension system)
- **Survivability** (hull shape, armor, weight effects on mobility)
- **Electrical power** generation, management and distribution
- **C4ISR** integration
- **Vehicle health monitoring** (data bus architecture and capacity)

Nevada Automotive Test Center (NATC): Designer and Integrator



Questions?

"Making the Transition to the Future"

MARINE CORPS SYSTEMS COMMAND
UNITED STATES MARINE CORPS

Assault Amphibious Vehicle (AAV) Information Brief

Presented to

NDIA 2009 Combat Vehicles Conference

Mr. Bryan Prosser
Program Manager, Assault Amphibious Vehicle Systems
12-14 October 2009

Briefing Agenda

- AAV Description, History, Operational Concept
- USMC AAV Future: Sustainment and Upgrade Strategy
- AAVC7A1 C2 Upgrade
- AAVS Upgrades

AAV System Description

- Armored assault amphibious full-tracked landing vehicle.
- Three variants in the AAV FOV:
  - AAVP7A1 – Personnel
  - AAVC7A1 – Command
  - AAVR7A1 – Recovery
- Primary Means of Armored Protected Mobility to the Ground Combat Element.
- Mission Profile for 20% Operation in Water and 80% on Land.

• **Mission**: *To maneuver the surface assault elements of the landing force and their equipment from assault shipping during amphibious operations to inland objectives and to conduct mechanized operations and related combat support in subsequent operations ashore.*

MARINE CORPS SYSTEMS COMMAND
UNITED STATES MARINE CORPS

AAV HISTORY

1971 — **LVT7 Fielded**

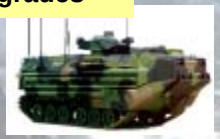
1975 — **LVT7A1 Service Life Extension Program (SLEP)**

1983 — **Re designated AAV7A1 to better reflect mission**

1986 — **AAV7A1 Reliability, Availability and Maintainability/Rebuild to Standard (RAM/RS) Program**

1987 — **Product Improvement Program (PIP)-Upgrade:**
- Lethality
- Survivability
- Communications

1999 — **C7 Upgrades**



2007

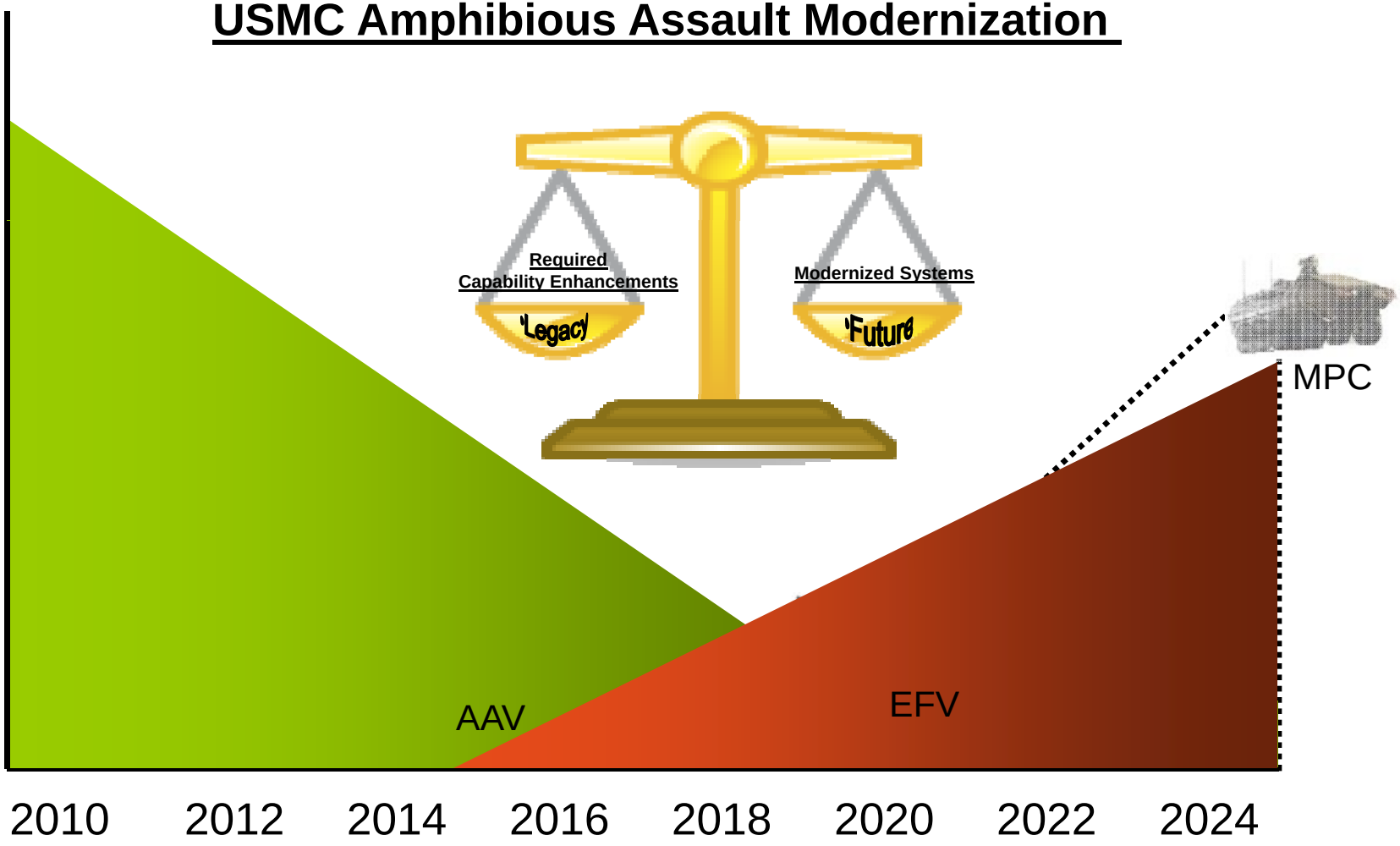
2011

2013 — **Improved-Upgunned Weapons Station and Survivability, C4I, Upgrades**

AAV Sustainment and Upgrade Strategy

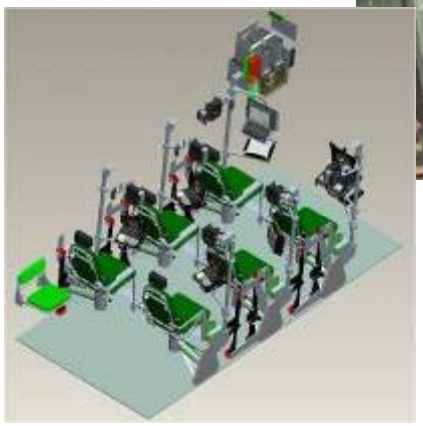
- **Remain in USMC inventory until fully replaced by the Expeditionary Fighting Vehicle (EFV).**
- **Depot maintenance rotation (IROAN) to maintain operationally ready condition.**
- **Develop and field modifications/ECPs required to address issues related to safety, reliability, parts obsolescence and emerging requirements.**
- **Apply available capability enhancements to the current configuration to maintain platform viability.**
- **Provide system upgrades to the AAV FOV which will address critical capabilities gaps in the areas of weapons capability along with survivability, and C4I.**

USMC Amphibious Assault Modernization



AAVC7A1 C2 Upgrade

- **Required operational attributes include:**
  - **Replace obsolete communications equipment and providing HF, VHF and UHF LOS and UHF SATCOM capability**
  - **Provide 6 functionally interchangeable staff work stations capable of hosting current MAGTF C2 applications**
- **Partnered with SPAWAR, Charleston for design, development, testing, and production/deployment**



AAV Upgrades

Upgrades focus on the following areas:

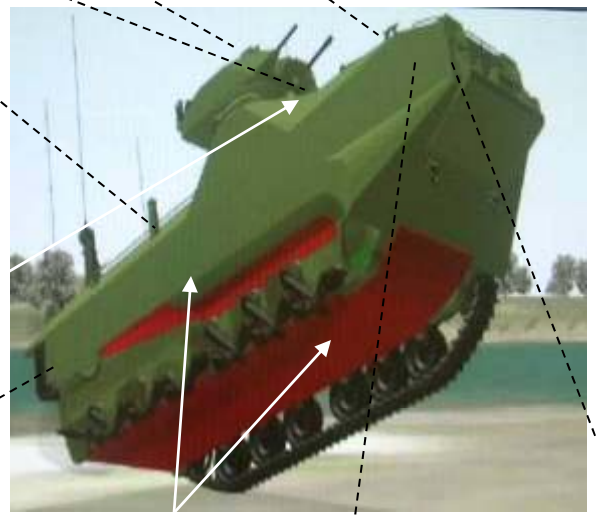
- **Survivability**
  - Belly/Sponson Armor
  - Shock/Blast Mitigating Seats
  - Selected Location Spall Lining
  - Improved fire suppression system
  - CREW Integration
  - Infantry Troop Compartment Weapons Mounts
  - Situational Awareness Enhancement
  - Deck Plate Treatment
- **C4I**
  - Tactical Radio Refresh
  - Blue Force Tracking Integration
  - Improved Intercom
  - APU Integration
  - Improved Drivers Display
- **Improved Up-gunned Weapons Station**
  - Ballistic computer
  - Stabilized
  - Laser Range Finder
  - Thermal Sight

Improved Upgunned Weapons Station

Shock/Blast Mitigating Seats

Improved Driver's Display

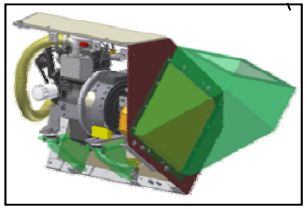
Infantry Troop Compartment Weapons Mount



CREW CVRJ

Belly and Sponson Armor Solutions

Blast Mitigating Bench Seats



Auxiliary Power Unit

QUESTIONS ?

Towards a Comprehensive Vehicle Strategy

LTG Michael A. Vane

Deputy Commanding General, Futures, and
Director, Army Capabilities Integration Center
US Army Training and Doctrine Command

13 Oct 2009

Revised Assumptions About the Future

Certainty **Defense Transformation Theory**	**Uncertainty** **Recent and Ongoing Conflicts**
Knowledge Centric	Fighting, Politics Centric
Planning Process	Design, Execution
Centralization	Decentralization
Risk Avoidance	Risk Mitigation
Efficiency	Effectiveness
Fires	Combined Arms Fire/Maneuver
See / ”Quality of Firsts”	Find and Understand
Rapid Decisive Operations	Sustained Campaigns
Systems Approach (EBO)	Complexity (Design)
Dominance	Strategy, Continuous Interaction
MCO Focus	Spectrum of Conflict
Linear Progression— Leap Ahead	Interaction with Adversaries— Continuous Innovation

Key Lessons Learned

- Provide Soldiers protected mobility: #1 priority
- Develop fighting vehicle for complex environments including urban operations
- Reduce predictable travel on established routes: better off-road mobility required
- Design platforms with sufficient growth potential for future capabilities
- Increase platform capacity to meet evolving threat
- Obtain better C2 on-the-move capability
- Push real time situational awareness to and from Company level and below
- Connect the Soldier to the network

Greater demand on small unit operations dictates that tactical vehicles must be protected, mobile, and networked

Capability Packages

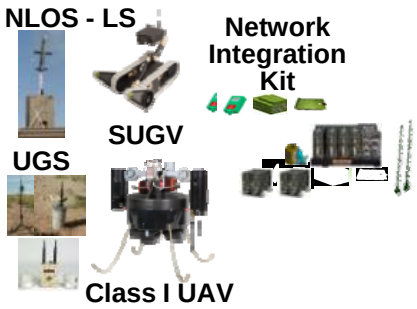
Spin-outs + Warfighter Urgent Requirements =

Capability Packages

-Provides incremental improvements delivered in two-year cycles
- Enables ARFORGEN beginning FY11
- Incorporates capabilities requested by Commanders in the fight

Capability Package 11-12

Spin-outs



Warfighter Urgent Requirements

- Persistent Surveillance
- Advanced Precision Mortar Initiative
- Ground Soldier System
- Human Terrain Teams

Future Capability Packages will include:

- More capable Unmanned Air Vehicles (greater range, loiter and payload capability)
- Larger Unmanned Ground Vehicles
- Improvements to the Network (more information and imagery at lower levels)

Provides increased near-term capabilities to the Warfighter

Network Modernization

- *Battle Command Essential Capabilities*
- *Two-year increments*
- *Field to ARFORGEN specified forces*
- *Affordable*

FY 17-18

FY 15-16

FY 13 - 14 →

Incremental Improvement

FY 11 - 12 →

Incremental Improvement

Current →

Baseline

Interoperable functional applications; communications transport; and network services

Match Pace of Change with Technology and Operating Environment

Combat Vehicles Methodology

- **Capability Gaps**
- **Attribute Balancing**
- **Technology Feasibility**
- **Costs**
- **Other Analysis**

→

Key Attributes
- **Versatility**
  - Roles
  - Functions
  - Scalability
- **Force Protection**
- **Survivability**
- **Mobility**
- **Lethality**
- **RAM** (Reliability, Availability, Maintainability)

↓

- **Align to force mix**
- **Incorporate MRAP**
- **Combat Vehicle Roadmap**
  - Reset
  - Upgrade
  - Divest
  - New

Ground Combat Vehicle Operational Design Principles

Versatility

Force Protection

Network Integration & Interoperability

Mobility

Sustainability

Lethality

Transportability

Resource Informed, Incremental Approach

- Use strategy and risk assessment to drive procurement, rather than the other way around
- Move timelines for concepts and assessments in closer
- Trade across warfighting functions, formations, & Services
- Develop integrated DOTMLPF solutions
- Strengthen synchronization with Training and Leader Development
- Prioritize capabilities and align with ARFORGEN
- Synchronize decision points for budget, POM, and force structure
- Design to technology readiness and costs
- Interface operational requirements work earlier with S&T
- Conduct earlier and better cost benefit analysis
- Buy less, more often

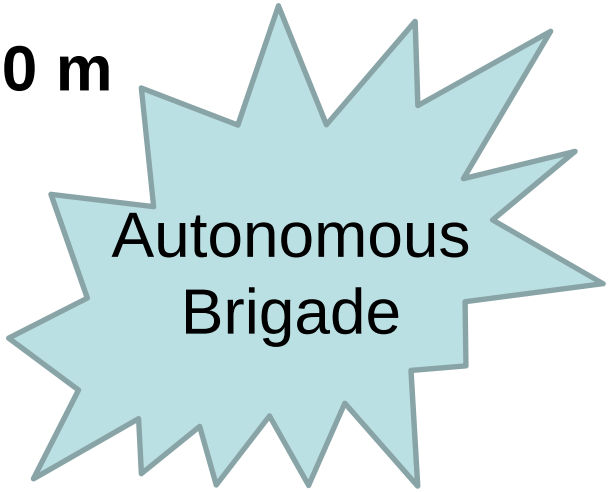
*Build a **versatile mix** of **tailorable and networked organizations**, operating on a **rotational cycle**, to provide a **sustained flow** of trained and ready forces for **full spectrum operations** and to hedge against **unexpected contingencies** at a **sustainable tempo** for our all-volunteer force*

Insights for Future Developments

- **Improve Force Protection**
  - **Fire Suppression**
  - **Active Protection Systems**
  - **Reactive Armor at Lighter Weights**
- **Power and Energy**
  - **Energy Efficiency**
  - **Exportable Power**
  - **Power management on Vehicles**
  - **Enhanced Thermal Management on Board**
  - **Directed Energy**
- **Generating Non-lethal Effects from 50-500 m**
- **All Weather Sensor Capability**
- **Combat Identification**
- **Optics Defeat Capabilities**
- **Human Dimension**

Big Five WFO

- Battle Command
- C-IED/Mines
- Power and Energy
- Human Dimension
- Training



Towards a Comprehensive Vehicle Strategy

LTG Michael A. Vane

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US Army Training and Doctrine Command

13 Oct 2009

Back-up

GCV ICD Capability Gaps

Protection and Survivability

- Detections and neutralization of mines and IEDs, from standoff
- Armored vehicle underbelly protection & crew protection against IEDs and mines
- Armored and light vehicle protection against kinetic, chemical, and tandem blast warheads
- Occupant protection against IEDs and mines

Network

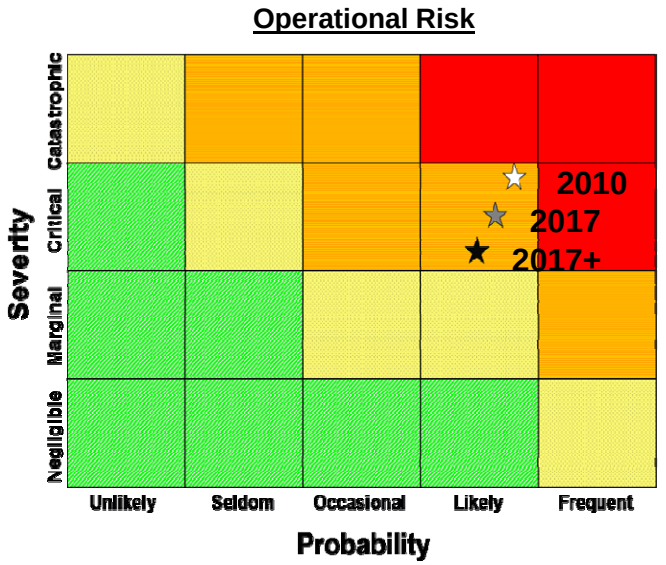
- Non-interrupted communications for dispersed units
- Mounted and dismounted SA and communications, especially for dispersed units
- Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance embedded at all echelons

Mobility

- Maneuver for positional advantage across range of terrain
- Non-maneuver element mobility and survivability

Lethality

- Direct fire overmatch against high threat targets
- Non-lethal weapons to achieve effects while limiting casualties and collateral damage
- Organic precision indirect fires, especially in support of dispersed units
- Sensor-to-Shooter for cooperative engagements



Risk Assessment all BCTs
Current Force (2010)
Upgraded Platforms (2017) (Included in POM)
Upgraded Platforms (2017+) (Not in the POM)

GCV ICD Recommended Solutions

- **Non-material solutions.**
  - D, O, T, L cannot satisfy all capability gaps related to combat vehicles

- **Materiel Solutions Assessed**
  - Current COTS/GOTS vehicles
  - Recapitalization of existing vehicles
  - New Start

- **GCV new start (Modified Off the Shelf or New Design) will**
  - Increase versatility
  - Provide protection equivalent to MRAP (Initial increments) and better off-road mobility (mobile armored protection)
  - Allow growth to integrate improved protection measures and other technologies as they mature (Future increments)
  - Reduce logistics
  - Support integrated battle command systems (Soldier in the Network) in complex terrain.
  - Provide lethal self-protection to defeat like systems while hosting non-lethal systems to enable operations among populations

- **Recapitalization (upgrades of current vehicles) will help mitigate some capability gaps during GCV development**

Capability Set 13-14 Development Objectives

Drivers for Next Capability Set Solutions

Communications Network

- Aerial Tier to extend or expand communications network to meet commander's priorities
- Simplify Network Management by integrating current collection of network management toolsets
- Federate multiple Networks supporting the BCT, focusing on Trojan Spirit & CSS/VSAT
- Enable BCT access to JIIM to support specific functions and meet critical information delivery standards

Battle Command Applications

- Across Echelons
  - Provide standard Geospatial foundation that can be used for precision targeting, and locations by every Command Post, platform and dismounted leader
- Battalion and Above
  - Reduce physical footprint of the Maneuver Battalion & BCT TOCs by 15% of its current square footage
  - Provide Battalion & Brigade Commanders the ability to use Battle Command applications in their vehicle anywhere on battlefield
- Company and Below
  - Reduce latency by 10X for C2 & SA information exchange
  - Provide ability to send & receive still Imagery from/to battalion and down to squad leader

Context of Future Armed Conflict

Defense Priorities

Defend the Homeland // Win the Long War // Promote Security // Deter Conflict // Win our Nation's Wars

Comprehensive Lessons Learned
- Counterinsurgency operations
- Stability operations
- Urban operations
- Full Spectrum Operations
- Security Force Assistance
- Training for Full Spectrum Operations
- Modernization, Acquisition, Generating Force

Operational Environment
- Extended Distances
- Access Limitation
- Among the People
- Complex Terrain
- Systems Warfare
- Rapid Tactical Transition

CCJO
- Combat
- Security
- Engagement
- Relief/Reconstruction

CSA White Paper
- Deter and defeat hybrid threats
- Prevail in protracted COIN campaigns
- Engage to help others build capacity
- Support civil authorities home and abroad

Capstone Concept 2009
- Assist Foreign Security Services
- Entry & Shaping Operations
- Inter- and Intra-Theater Operational Maneuver
- Simultaneous Offensive, Defensive, and Stability (or Civil Support) Operations
- Distributed Support & Sustainment
- Network Enabled Mission Command

NDIA
Combat Vehicle Conference

13 October 2009

Mr. Edward M. Harrington
Deputy Assistant Secretary of the Army
(Procurement)

Outline

- Role of the Office of the Deputy Assistant Secretary of the Army
- Contracting Reforms Impacting Systems Acquisitions
- Questions/Discussion

Role of the DASA (Procurement)

- Senior Enterprise staff responsible to the Army leadership for management, measurement, oversight, and continuous improvement of the Army Procurement Mission
- Manage the education and training of the contracting and industrial specialist workforce
- Develop policies, processes, and tools, and support Army doctrine for the full range of contracting
- The Army's Competition Advocate
- The Army's interface on procurement with OSD, Defense Agencies, Small Business, the Joint Staff, Congress, the Army Staff, and Heads of Contracting Activities, Principal Assistants Responsible for Contracting, and non-contracting elements

Acquisition Systems Reform Act

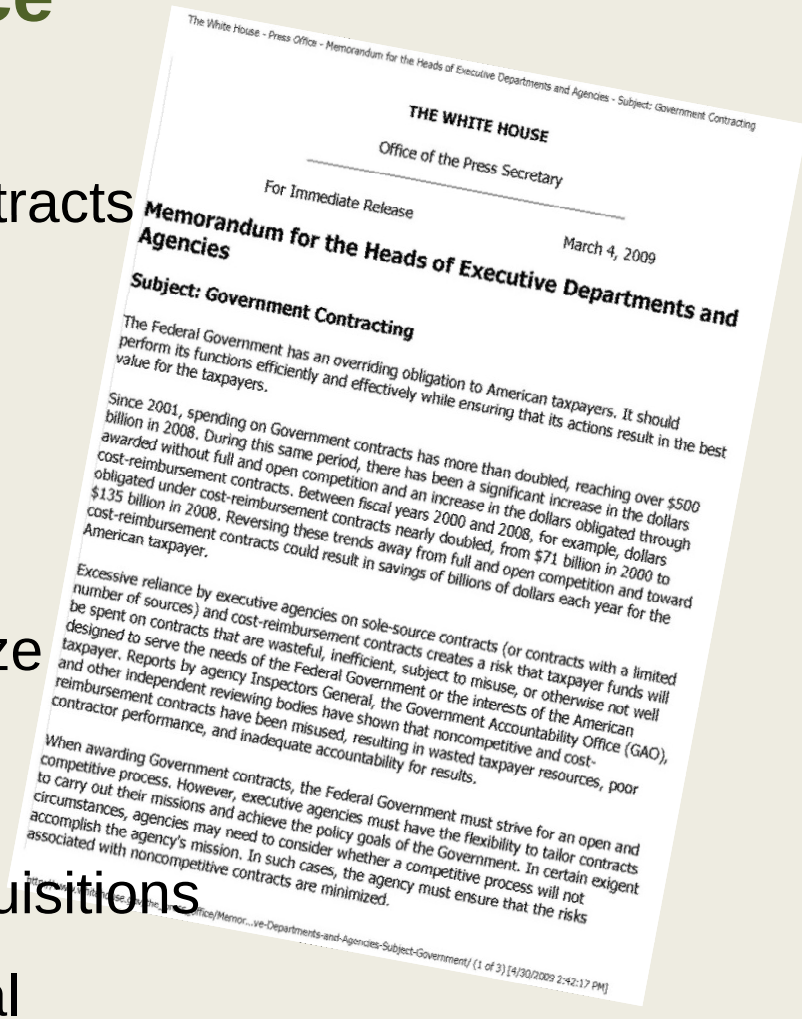
- Establishes Director of Developmental Test and Evaluation and Dir. of Independent Cost Assessment
- Directs an assessment of the technological maturity of critical technologies of MDAPS
- Directs the JROC to seek and consider input from Combatant Commanders on joint requirements
- Directs consideration of tradeoffs between system cost, schedule, and performance
- MDA must receive a preliminary design review and conduct a formal post-preliminary design review assessment before Milestone B approval
- Specific actions upon MDAP critical cost growth
- Establishes Conflict of Interest Review Board

Lead System Integrator Changes

- LSI: a contractor or team hired to execute a large, complex, system-of-systems program
- Section 802 of the National Defense Authorization Act for Fiscal Year 2008 limits LSI use
- Proposed DFARS language allows LSI awards when:
  - The major system has not progressed beyond LRIP production; or
  - The Secretary of Defense determines that LSI is in the best interest of the DoD
- **After October 1, 2010, LSI awards prohibited**
- LSI cannot have a financial interest in development or construction
- PM ensures Government performs inherently governmental functions

Presidential Guidance

- Limit non-competitive contracts
- Maximize competitive procurement processes
- Fewer cost-type contracts
- Choose contract types to minimize risk and maximize value to the Government
- Develop the workforce to manage and oversee acquisitions
- Clarify when governmental outsourcing for services is and is not appropriate



The White House - Press Office - Memorandum for the Heads of Executive Departments and Agencies - Subject: Government Contracting

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

March 4, 2009

Memorandum for the Heads of Executive Departments and Agencies

Subject: Government Contracting

The Federal Government has an overriding obligation to American taxpayers. It should perform its functions efficiently and effectively while ensuring that its actions result in the best value for the taxpayers.

Since 2001, spending on Government contracts has more than doubled, reaching over $500 billion in 2008. During this same period, there has been a significant increase in the dollars obligated through awarded without full and open competition and an increase in the dollars obligated through cost-reimbursement contracts. Between fiscal years 2000 and 2008, for example, dollars obligated under cost-reimbursement contracts nearly doubled, from $71 billion in 2000 to $135 billion in 2008. Reversing these trends away from full and open competition and toward cost-reimbursement contracts could result in savings of billions of dollars each year for the American taxpayer.

Excessive reliance by executive agencies on sole-source contracts (or contracts with a limited number of sources) and cost-reimbursement contracts creates a risk that taxpayer funds will be spent on contracts that are wasteful, inefficient, subject to misuse, or otherwise not well designed to serve the needs of the Federal Government or the interests of the American taxpayer. Reports by agency Inspectors General, the Government Accountability Office (GAO), and other independent reviewing bodies have shown that noncompetitive and cost-reimbursement contracts have been misused, resulting in wasted taxpayer resources, poor contractor performance, and inadequate accountability for results.

When awarding Government contracts, the Federal Government must strive for an open and competitive process. However, executive agencies must have the flexibility to tailor contracts to carry out their missions and achieve the policy goals of the Government. In certain exigent circumstances, agencies may need to consider whether a competitive process will not accomplish the agency's mission. In such cases, the agency must ensure that the risks associated with noncompetitive contracts are minimized.

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OMB Guidance: Reduce Contracts 10%

- 29 JUL 09 Memo – Phase One of implementing President Obama's 4 MAR 09 guidance
- Review existing Contracts and Acquisition Practices
    - 7% savings by FY11 (of baseline contract spending)
    - 10% reduction of dollars obligated in FY10 of high-risk contracts
- Administration anticipates $40B cost savings annually
- Phase Two guidance to be issued early FY10

Contract Type Changes

- Preference for Fixed Price (FP) contracts over Cost
  - Preference for FP in R&D, System Design & Development (SDD)
  - Also a tenet of the Presidential memo
- Move from Award Fees toward Incentive Fees
  - From FPAF to FPIF, from CPAF to CPIF
  - Ensure measurable criteria for award fees
  - Avoid factors like customer satisfaction, responsiveness
  - Prefer factors like on-time delivery, savings
- Reduce the number of Time & Materials contracts
  - Defense Contract Audit Agency estimates T&M contracts are as much as 30-40% too costly

Increased Emphasis on Competition

- Higher Army competition goal – 69%
  - Increased by 4% for FY09
  - Current FY09 competition percentage is 63%
- Impacts of increased goal on programs
  - J&As - Greater scrutiny by AAE
    - Shorter duration/reduced quantities
    - Approval pending AoA for ways to increase competition
  - TDPs - Conduct a careful business case analysis
    - Can TDP purchase up front result in lower total ownership cost?
  - Data Rights – conduct a careful business case analysis
    - Are Government Purpose (GP) rights sufficient to permit competition?
    - Have firms retained full rights to the key technologies making competition impossible even with GP right?
- MANPRINT
  - Consider human element of the design
  - Consider maintenance – ease and footprint

Contractor Business Processes and Systems

Additional importance of:

- Accounting
- Estimating
- Purchasing
- Internal Controls
- Quality Management
- Earned Value Management
- Supply Chain Quality Management

Increased Scrutiny

- Peer Reviews for Services Contracts over $50 Million
  - Over $500M requires Army review
  - Over $1B requires OSD review
- Congressional scrutiny
  - Zero-defect mentality for systems impacting:
    Life, Health, Safety, or Combat Power
- Technology Readiness Levels
  - Moving to low rate production before achieving acceptable TRLs rarely results in a successful program
  - Acquisition Reform Act language

Congressional Notification

- Do not award contracts over $5.5 Million without advance notice to Congress
- Even when the base award has already been announced, provide notification of task orders with:
  - Significant local impact
  - Significant political interest
- Congressional notification cannot be waived
- Follow AFARS 5105.303 and DFARS 205.303

Conclusion

- Regulatory restrictions increasing
- Increased focus on competition
- Increased scrutiny of systems affecting life, health, safety, and combat power
- Increased importance of effective business systems

Questions / Discussion

3rd Brigade
4th Infantry Division
Operation Iraqi Freedom
December 2007 – March 2009

Agenda

- Background
- Area of Operations
- Organization for Combat
- Capabilities
  Sadr City Operations
- Lessons Learned
- Challenges

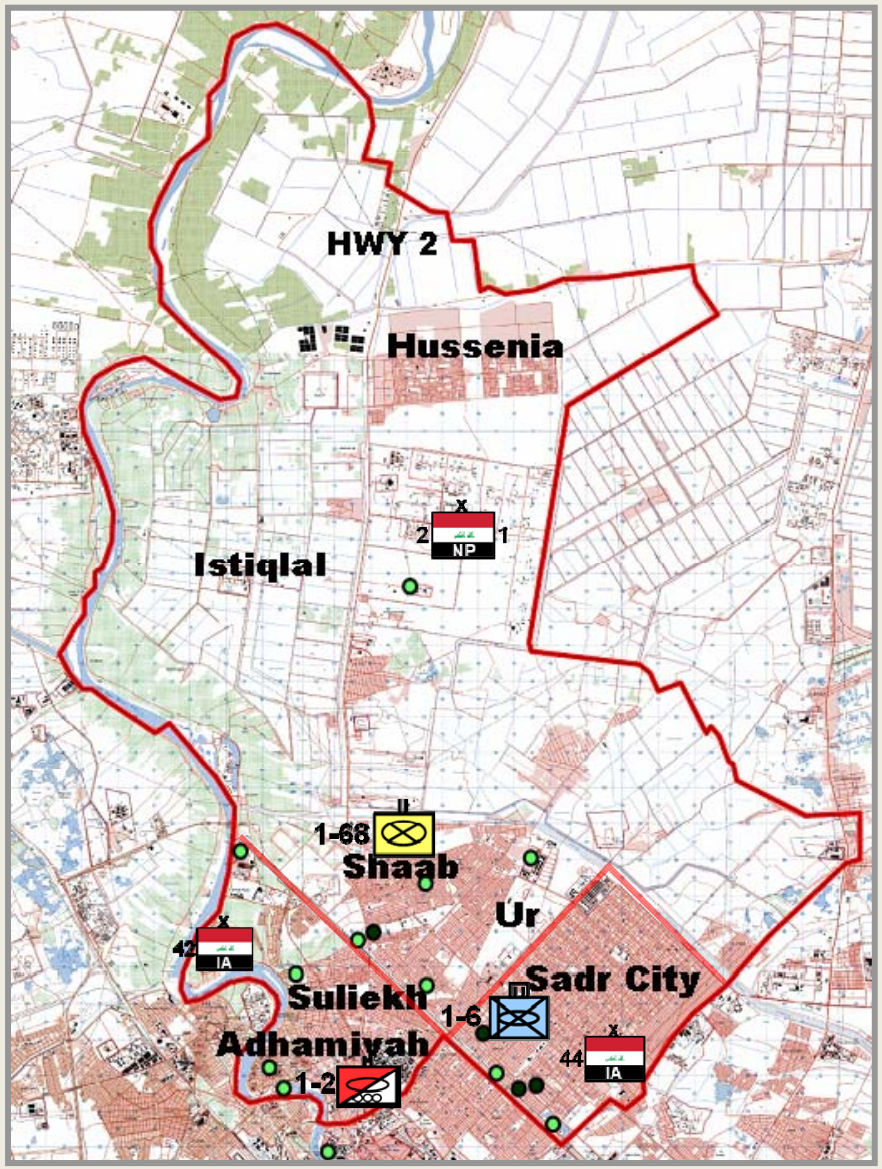
Brigade's Background

- Third deployment to Iraq
- Stabilized unit
- Deployed in Dec 07. Redeployed in Feb 09
- 50% of the Brigade deployed to other parts of Iraq = Mosul, W. Baghdad, and the Green Zone. Picked up other units once in theater.

3rd Brigade Area of Operations

North East Baghdad

- Civilian population: 4 million
- Congested urban setting
- Rural farmland
- Shia/Sunni mixed
- Sadr City = densely populated - 2.5 million.

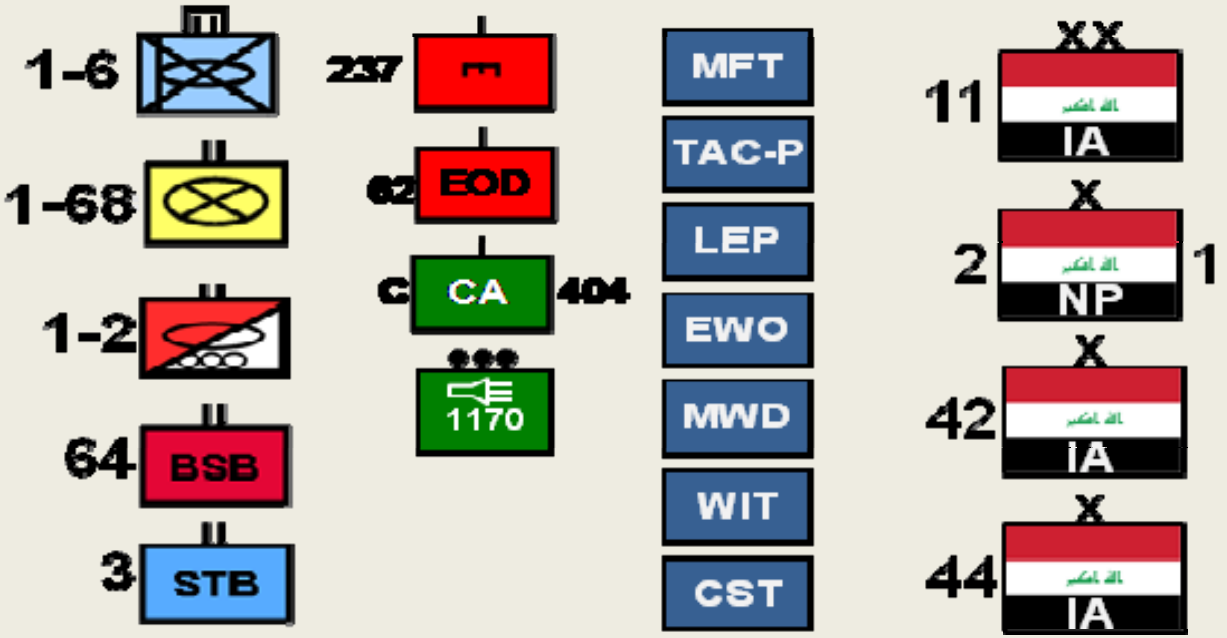


3rd Brigade Organization In Iraq

"Plug and Fight"

- Very Diverse
- Stryker, Airborne, and Mechanized Units
- About 4000 Soldiers

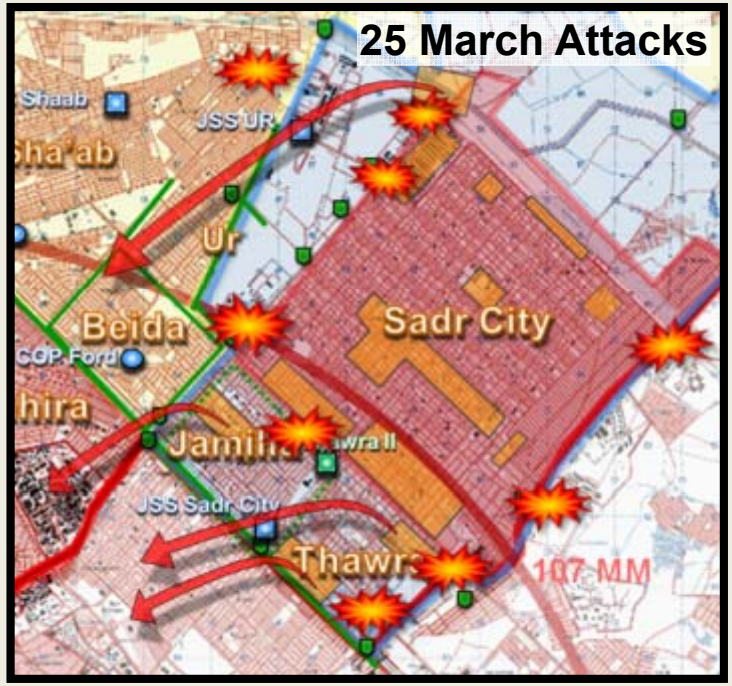
Task Organization in Theater



The Battle For Sadr City
(March to May 2008)

Background

- **August 2007**: Muqtada al-Sadr issues freeze Order/Cease fire
- **December 2007**: Sadr City restricted to Most Coalition operations
- **23 to 31 March**: Criminal militias fire 86 Rockets at the Green Zone
- **25 March**: Sadr Lifts Freeze; Militias Attack US and Iraqi Army across Baghdad
- **25 March to 15 May:** Two month battle in Sadr City to defeat rocket teams and Shia Militia.



Sadr City Operations

Operation Striker Denial 26 March-14 April

- Defeat militia rocket teams in Sadr City
- Seize key terrain at rocket points of origin
- Enemy in prepared positions
- City became a minefield/ House to house fighting ensued

Operation Gold Wall 15 April to 15 May

- Block enemy from using South Sadr City to launch rockets
- 2.5 mile Concrete TWall to deny the Enemy key terrain
- Fired 818 Tank rounds and 12,091 25mm rounds

Enemy Contact By Week

Lessons Learned
(Sadr City)

- Three dimensional maps
- Iraqi Army in the lead
- Wheeled based to heavy force in less than 48 hours
- Joint/Combined Arms effort: Tanks, Brads, Apaches, UAVs, fixed wing, snipers, and engineers
- Dedicated “Scouts” in the Ops Center (TOC).
- Tank/Bradley armament saved lives
- Paladins fired terrain denial in our support zones to protect flanks

Bottom line: The enemy could not compete with overwhelming firepower and continuous ops

Challenges

- **In the beginning, Seeing the Enemy**
- **Task organization**
  - Air space deconfliction
  - TOC/OP center multiple competing missions
  - Legacy battalion versus digitized
- **Rules of Engagement.**
  - Shoot/ Don’t shoot scenarios
  - Maintaining precision in our fire power
  - “you don’t need my permission to pull the trigger”

Questions?

U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT, & ENGINEERING CENTER (ARDEC)

Malcolm Baldrige National Quality Award 2007 Award Recipient

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Presentation Name: *Armaments for Combat Vehicles*

Date: *October 14th, 2009*

Speaker: *Dr. Joseph A. Lannon*

Speaker Title: *Director, ARDEC*

Armament Research, Development & Engineering Center

Research

Development

Production

Field Support

Demilitarization

Vision:

Innovative Armaments Solutions for Today and Tomorrow

Mission:

To develop and maintain a world-class workforce to execute and manage integrated life-cycle engineering processes required for the research, development, production, field support and demilitarization of munitions, weapons, fire control and associated items

Advanced Weapons – line of sight/beyond line of sight fire; non line of sight fire; scalable effects; non-lethal; directed energy; autonomous weapons

Ammunition – small, medium, large caliber; propellants; explosives; pyrotechnics; warheads; insensitive munitions; logistics; packaging; fuzes; environmental technologies and explosive ordnance disposal

Fire Control – battlefield digitization; embedded system software; aero ballistics and telemetry

ARDEC provides the Technology for Over 90% of the Army's lethality; Significant support to other services' lethality

Supporting the Current Fight

FY06

Picatinny Blast Shield

Hand Emplaced Shape Charge Assembly

Rapid Entry Vehicle

Army's Greatest Inventions

FY07

SWORDS

Excalibur 1a-1

CROWS Lightning/ PDCue

M1A1/A2 Gunner/Loader Protection

M110 Semi Automatic Sniper System

Bridge Erection Boat - Force Protection

Objective Gunner Protection Kit

FY08

O-GPK Overhead Cover

M2 Cal 50 Extender

XM32 Abrams Reactive Armor Tile II

Picatinny Weapon Elevation Kit

Small/Med Machine Gun Weapon Cradle

CROWS/PDCue

FY09

Objective Weapon Elevation Kit

Non-standard Vehicle Armor

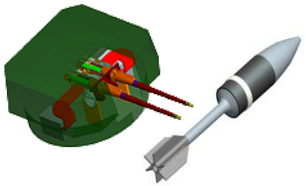
Sherlock

- Armor - Weapons - Ammo - Entry Control Point
- Modification Kits - Sensors - C-IED

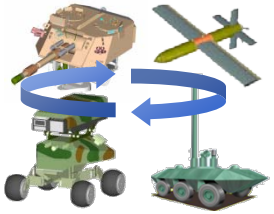
Purple = SOCOM

134 SUCCESSFUL FIELDINGS SINCE 9/11/2001

Supporting the Future Force Through Technology Investments

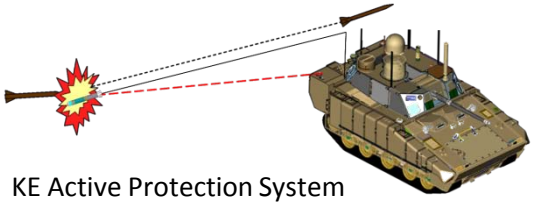


Extended Area Protection & Survivability

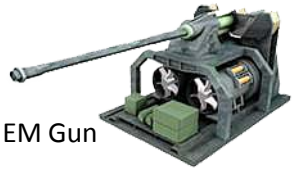


Networked Lethality

Acoustic/Seismic Sensors

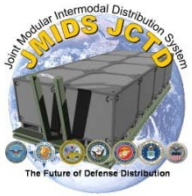


KE Active Protection System Interceptors

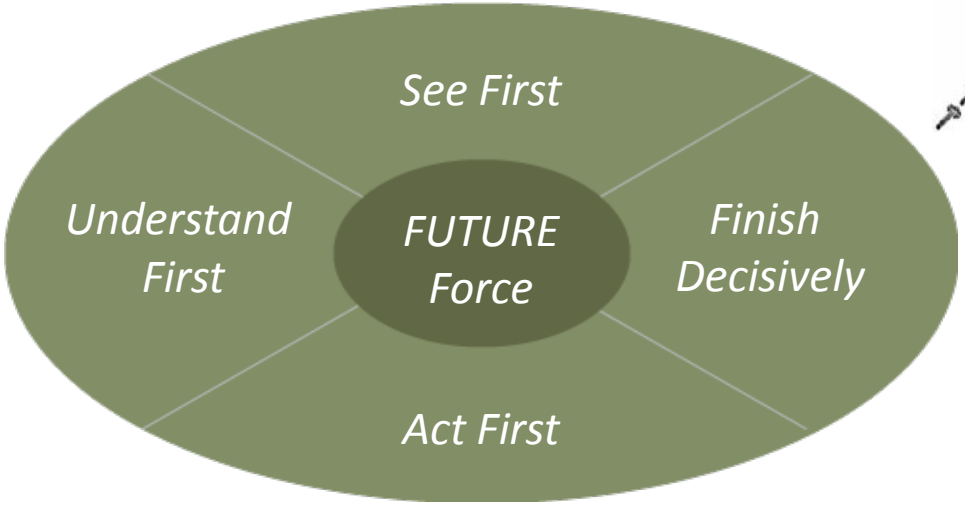


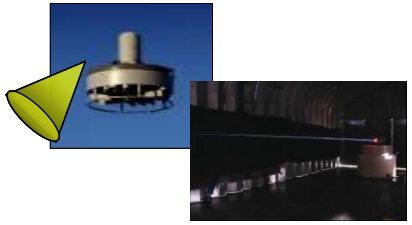
EM Gun

Multi-Mode Warheads



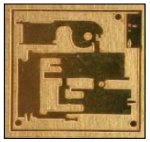
Joint Modular Intermodal Distribution System



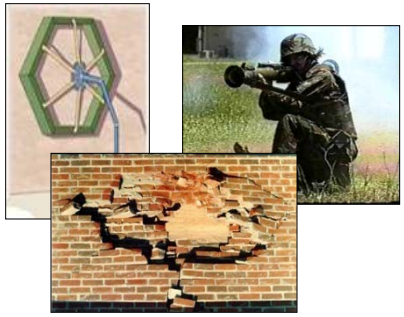


High Power Microwave & LIPC

MEMS IMU

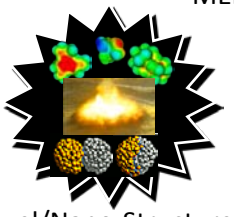


MEMS S&A Fuze & Power



MOUT

Scaleable Effects



Novel/Nano-Structured Energetics

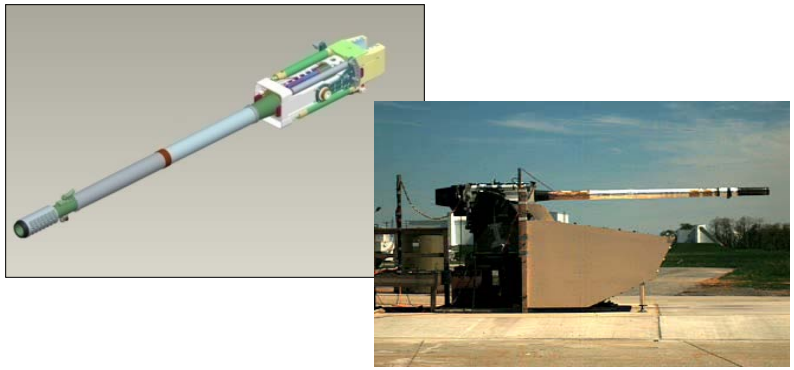
LtWt Small Arms Technologies

Future Combat System Technology Transitions

Partnerships (Cooperative Research and Development Agreements (CRADAs) in support of the Future Combat System (FCS)

XM360 Lightweight 120mm Primary Weapon Assembly; GDLS/ARDEC CRADA

ARDEC provides primary armament system for FCS Mounted Combat



MRM CARTRIDGE, 120 MM,XM1111

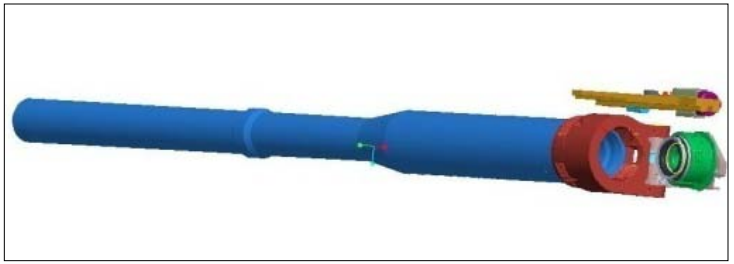
Mid Range Munition Guided Anti-Armor Multi-Purpose (MRM-GAAMP) will provide a precision, beyond-line-of-Sight (BLOS) capability from 2-12km for the FCS Mounted Combat System. Significant ARDEC Tech Base investment has Directly Transitioned to SDD in Support of FCS.

XM324 Non-Line-Of-Sight Cannon (NLOS-C); BAE/ARDEC CRADA

ARDEC provides primary armament system for FCS NLOS-C Manned Ground Vehicle

XM235 Non-Line-Of -Sight Mortar (NLOS-M); BAE /ARDEC CRADADEC

Provides Mortar tube and breech for FCS NLOS-M Manned Ground Vehicle

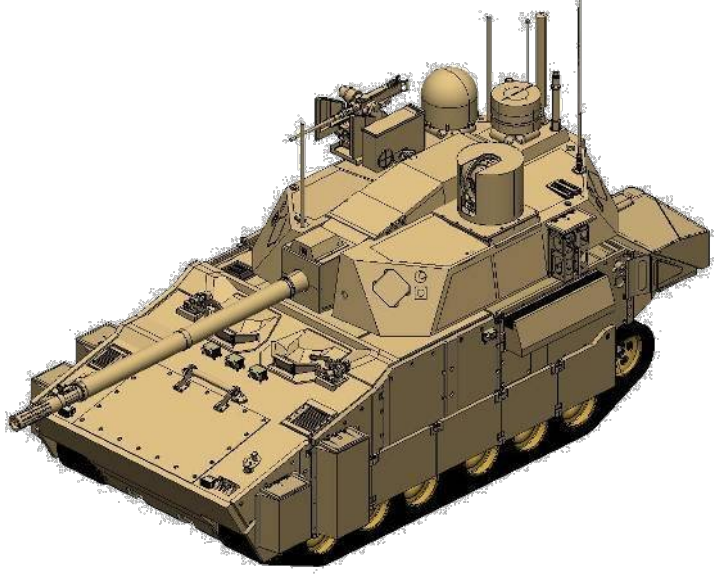


ARDEC is prepared to transition products to GCV, Bradley, & Abrams

Implementing Technology in Products: 120mm XM360

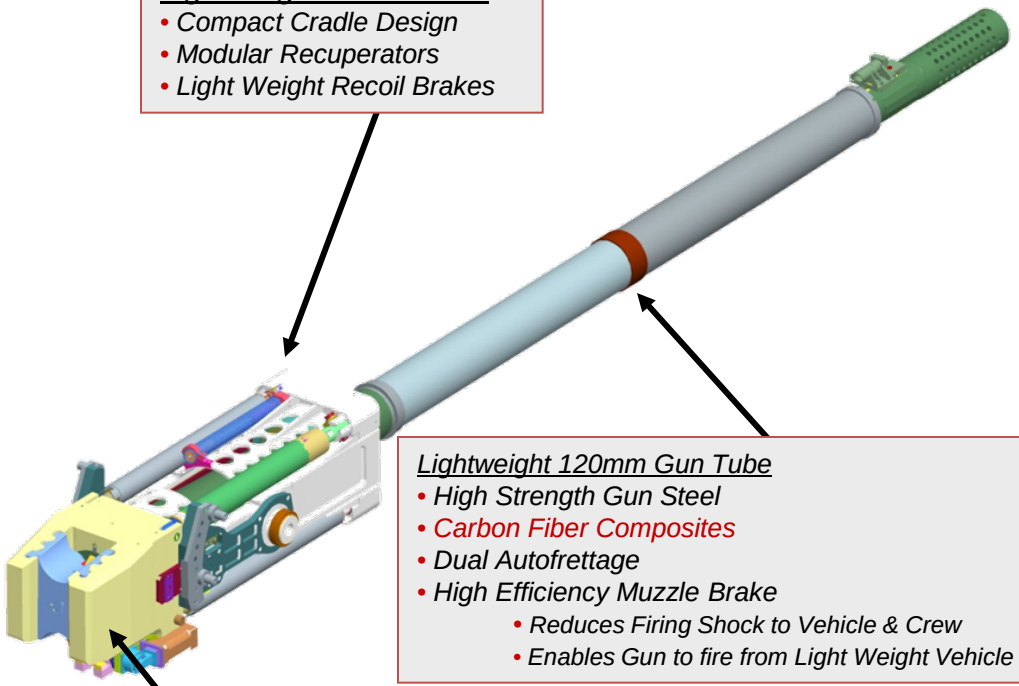
Primary Weapon for Mounted Combat System

- *Provides direct fire in support of forces in the Unit of Action (UA).*
- *Beyond Line-of-Sight (BLOS) capability to 12 km with Medium Range Munitions (MRM).*
- *All the Performance of Current 120mm Cannon in a Light Weight, Compact Design*
- *Over 2,000 lbs lighter than 120mm Gun used on Abrams Tank*
- *Muzzle Brake & Recoil System Design Enables a 120mm Gun to fire from a Lightweight Vehicle.*



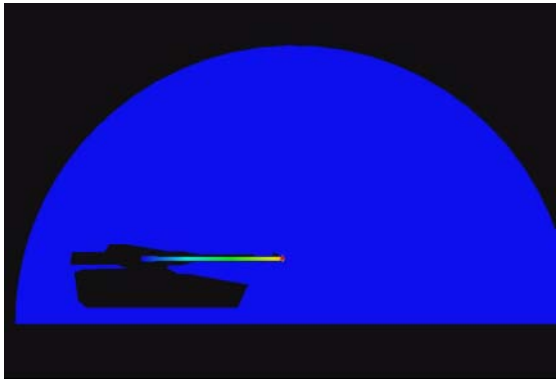
GENERAL DYNAMICS
Land Systems

Lightweight Gun Mount
- *Compact Cradle Design*
- *Modular Recuperators*
- *Light Weight Recoil Brakes*

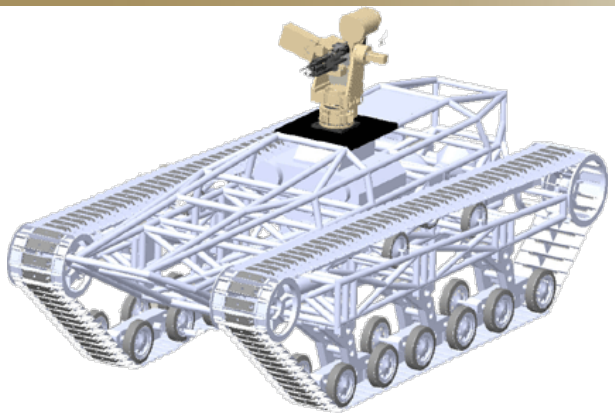


Lightweight 120mm Gun Tube
- *High Strength Gun Steel*
- *Carbon Fiber Composites*
- *Dual Autofrettage*
- *High Efficiency Muzzle Brake*
  - *Reduces Firing Shock to Vehicle & Crew*
  - *Enables Gun to fire from Light Weight Vehicle*

Multi-Lug Breech Mechanism
- *Long Life, Compact, Light Weight*
- *600VDC Electrically Actuated*
- *Ammo Data-Link Enables Communication to Smart Rounds*



Robotics: Improving Lethality



Ripsaw

ARAS
Advanced Robotic
Armament System

Picatinny Lightweight Remote
Weapon Station (PLRWS)
on TARDEC
Advanced Robotic Platforms

Lethal Robotics

ARDEC integrates Remote Weapon Stations (RWS) onto a slue of robotic platforms.

- Picatinny Light Weight RWS onto Ripsaw
- CROWS II RWS onto Ripsaw
- Picatinny Light Weight RWS onto the Tactical Amphibious Ground System-Common Experimental (TAGS-CX).

ARDEC developing next generation Robotic Armament Systems.

- Lethal and Non-Lethal from one system
- Auto Reload for Ammunition
- ARAS ATO – currently at TRL 6

Warfighter Payoff

Warfighters can effectively engage threats with lethal and non-lethal rounds while remaining protected.

CROWS II RWS

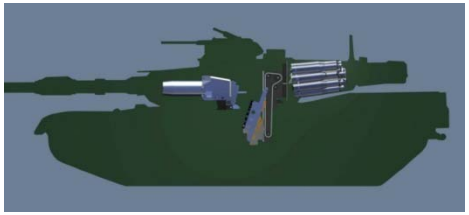
Additional Weapon Technologies

Laser Ignition

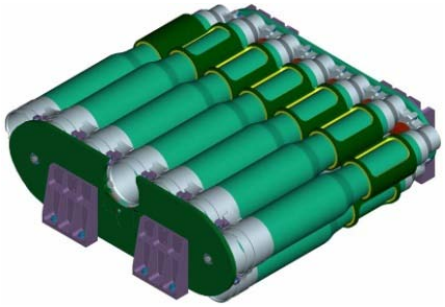
M3WS

LIPC

XM297



Compact Auto Loader



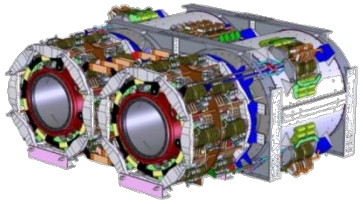
Anti Fratricide
Barrier Material

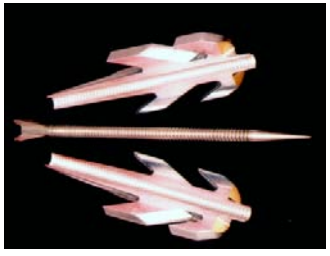
ON-MT

M777

ARDEC's Innovative Firepower
EM Gun

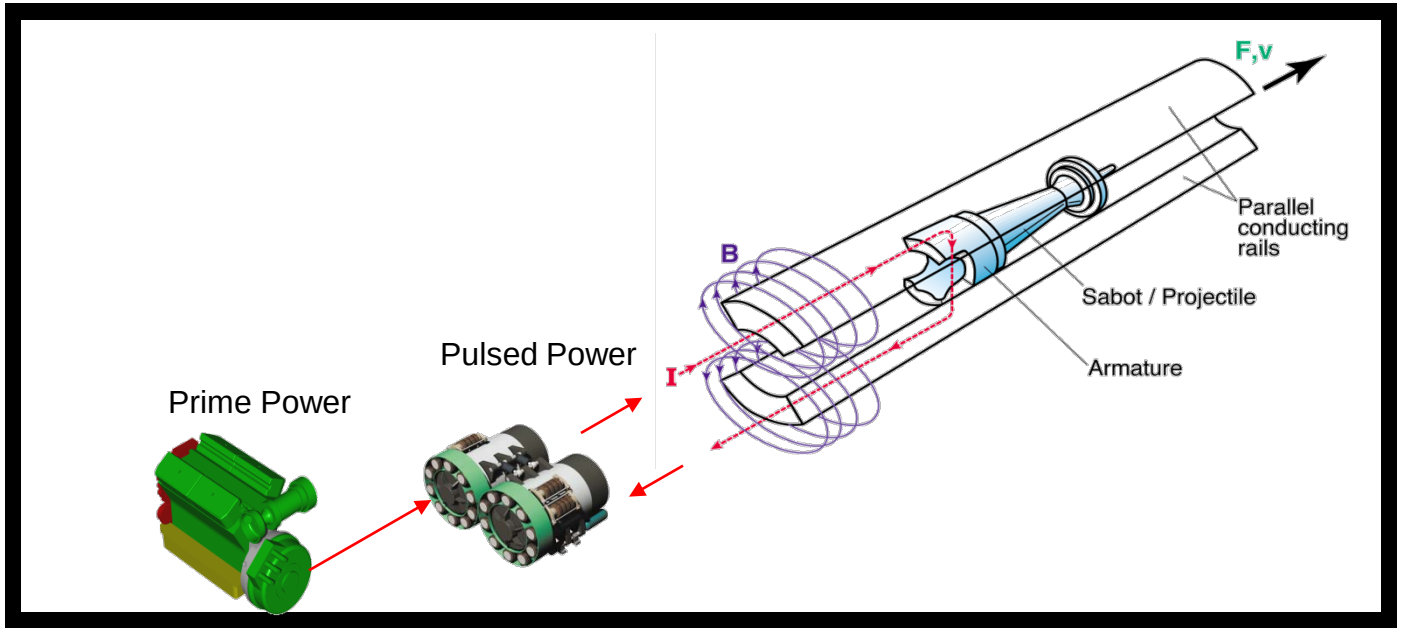
EM Guns differ fundamentally from conventional guns; The accelerating force (F) is provided by Electro-Magnetic forces, not rapid expansion of gases as seen in energetic propellants.





- Understand lethality of hypervelocity penetrators against projected future threat protection packages
- Projected future lethality gap can potentially be nullified by novel hypervelocity penetrators
- Powder-based guns cannot efficiently achieve hypervelocity due to tactical infeasibility

Impact Velocity	Monolithic Rods	Novel Penetrators
1500 m/s	Adequate data	Insufficient data
1850 m/s	Adequate data	No data
2200 m/s	Insufficient data	Insufficient data



In Summary – ARDEC …

- ARDEC retains proven in-house capability for Lethality/Non-Lethal enhancements
  - *Small, Medium, Large Caliber Applications*

- Expertise in Armaments System Engineering
  - *Weapons, Propulsion, Munitions, Warheads…*

- Technology has been matured through Tech Base Investments and CRADAs with Industrial partners.

- Government partnerships with Industry & Academia will continue to grow technology for future systems.

- ARDEC will continue to work with our TARDEC partners to provide Armaments Technology for current and future vehicles.

Our products assure decisive victory and bring our people home!

Contact Information

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Phone Number: *(973)-724-6001*

Organization: *U.S Army: Armament Research, Development & Engineering Center (ARDEC)*

Email: *joseph.lannon@us.army.mil*

The USMC M1A1 Tank Fleet

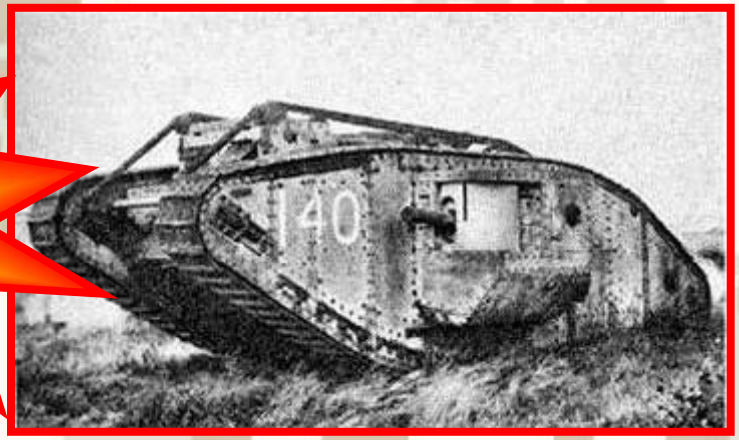
Supporting Marine Infantry in Every Clime and Place

Agenda

- Mission
- Current Configuration
- Current Enhancement Efforts
- Next Generation Improvements

Historical Perspective on Heavy Armored Vehicle Development

24 April 1918



USMC M1A1 Mission

To provide combat power in the amphibious assault and subsequent operations ashore, utilizing maneuver, armor protected firepower, and shock action to disrupt, disorganize, and destroy the enemy.

From open terrain…

…to the close fight

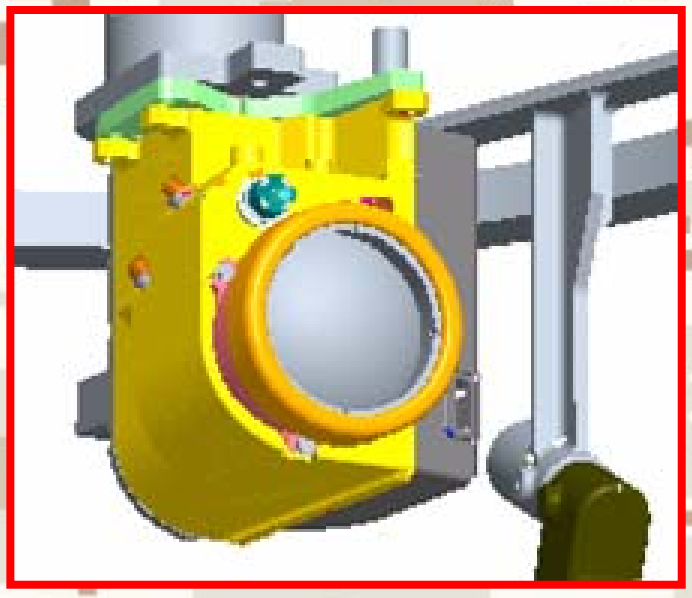
PM Tank Systems Mission

To equip operating forces with effective sustainable tank, heavy recovery, assault bridging, and support systems to accomplish their warfighting missions; and to incorporate next-generation technologies to ensure their continued combat dominance.

Current Configuration

- **M1A1 Tanks built in 1991 were built with *TOP END* 1970's technology**
- **Almost entirely analog technology**
  - **Many sub components no longer made**
- **Virtually all upgrades require independent solutions**
  - **Require additional cables and displays for each new capability**

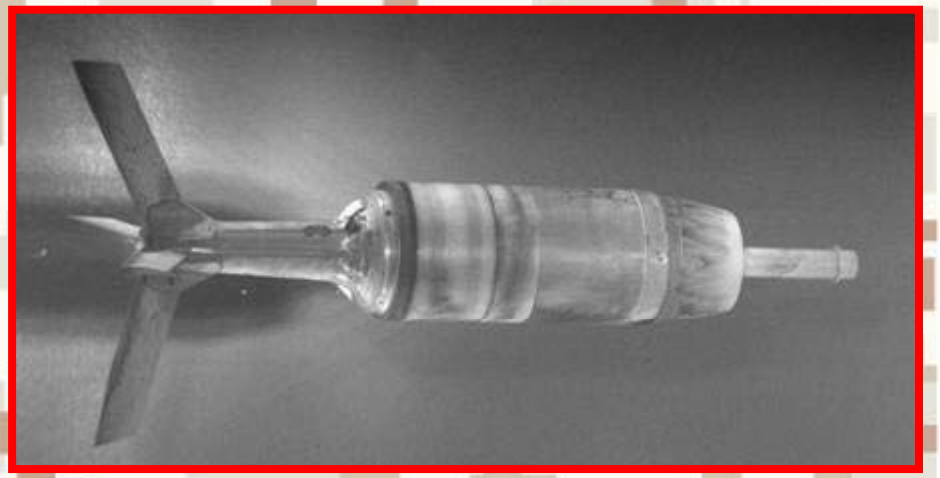
Current Upgrades



120mm Multi Purpose High Explosive

Background

- M830 HEAT no longer in production
  - Not designed for close fight
- MPAT provides marginal performance
  - Over penetration on soft targets
  - Small warhead
- Canister has limited range
- Addresses long range ATGM threat
  - Increases Lethality & Survivability



- **Primary Requirement**
  - **To address a broad target array with three modes of fuse operation:**
    - **Point Detonating - for lightly armored targets and wall breaching**
    - **Delay - to engage threats behind walls or in bunkers**
    - **Airburst - for dismounted troop targets**

120mm MP-HE Performance

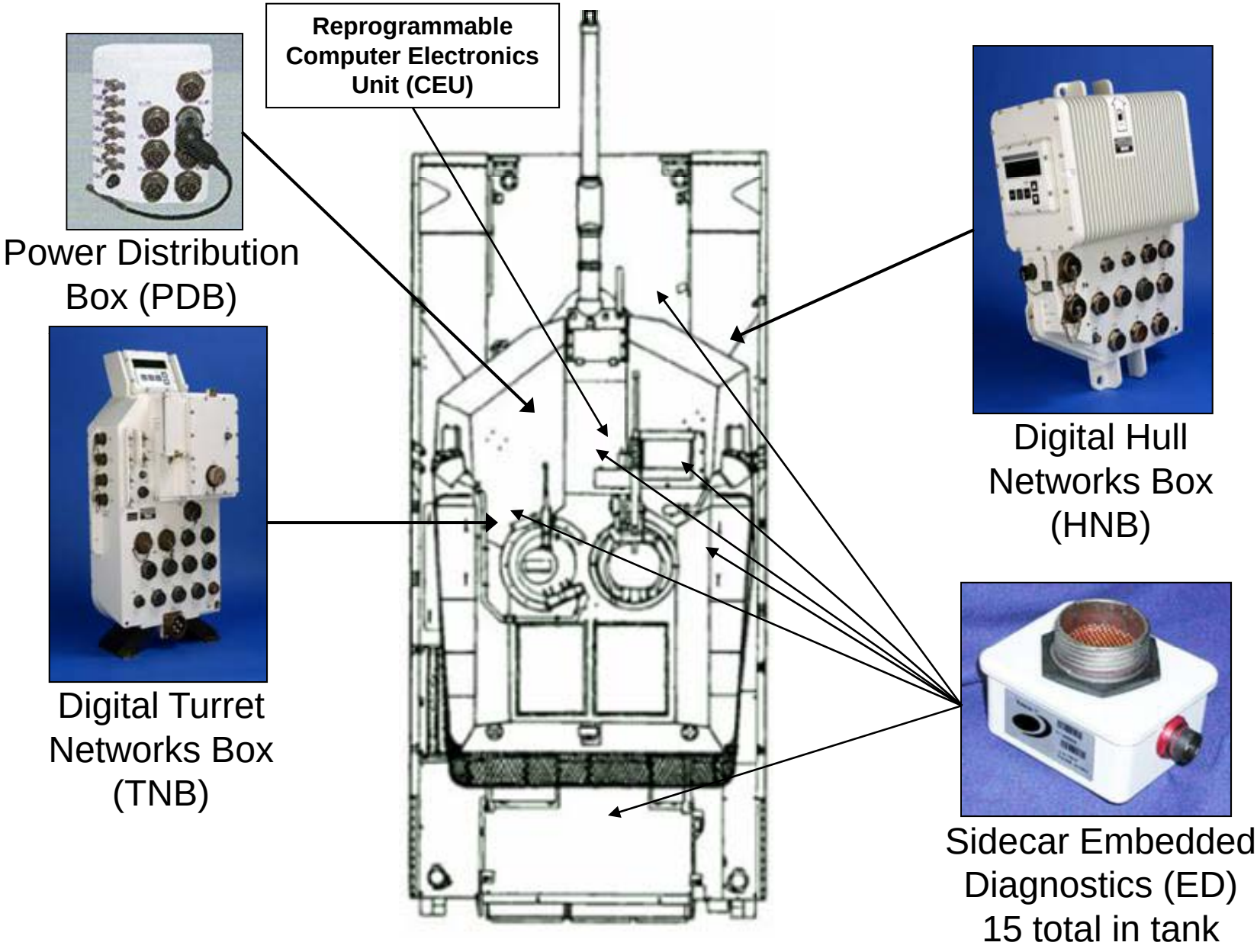
Before

Before

After 3 shots

After 1 shot

Obsolescence Mitigation



Improved Loader's Weapon Station (ILWS)

Description

• The Improved Loaders Weapon Station (ILWS) will allow the loader to engage enemy combatants under the armor protection of the M1A1 MBT. The system will have a day and night firing capability with two and three power zoom. It will have an increased round capacity, decreasing the amount of reloading and further protecting the crew.

Next Generation Improvements

- **Weight reduction always desired**
  - **Lighter armor with same capability**
  - **Cable reduction (current cables ~2 tons)**
- **Obsolescence mitigation critical**
- **Insertion of open architecture to support**
  - **3rd GEN thermal technologies**
  - **Sharing of info/workload across crew**
  - **Active Protection Systems**
- **Integrated cooling/heating solution**

An Expanding Marine Corps

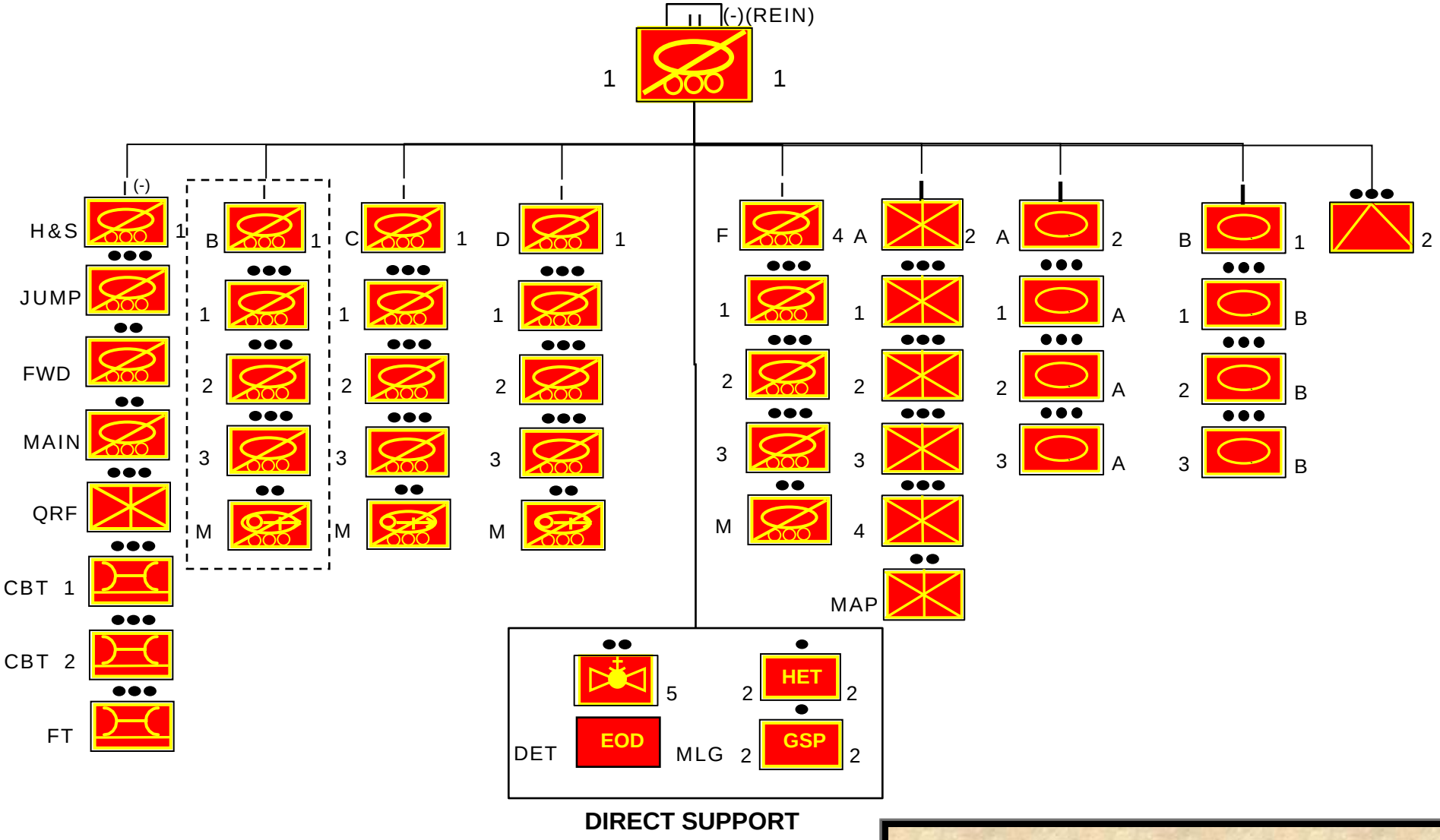
- **Increase of 44 tanks as part of USMC expansion to 202,000 active duty Marines**
  - **Two additional active tank companies**

- **Increased AAO for M88A2 as well**
  - **Needed to support more heavy assets being fielded across the Marine Corps**

USMC

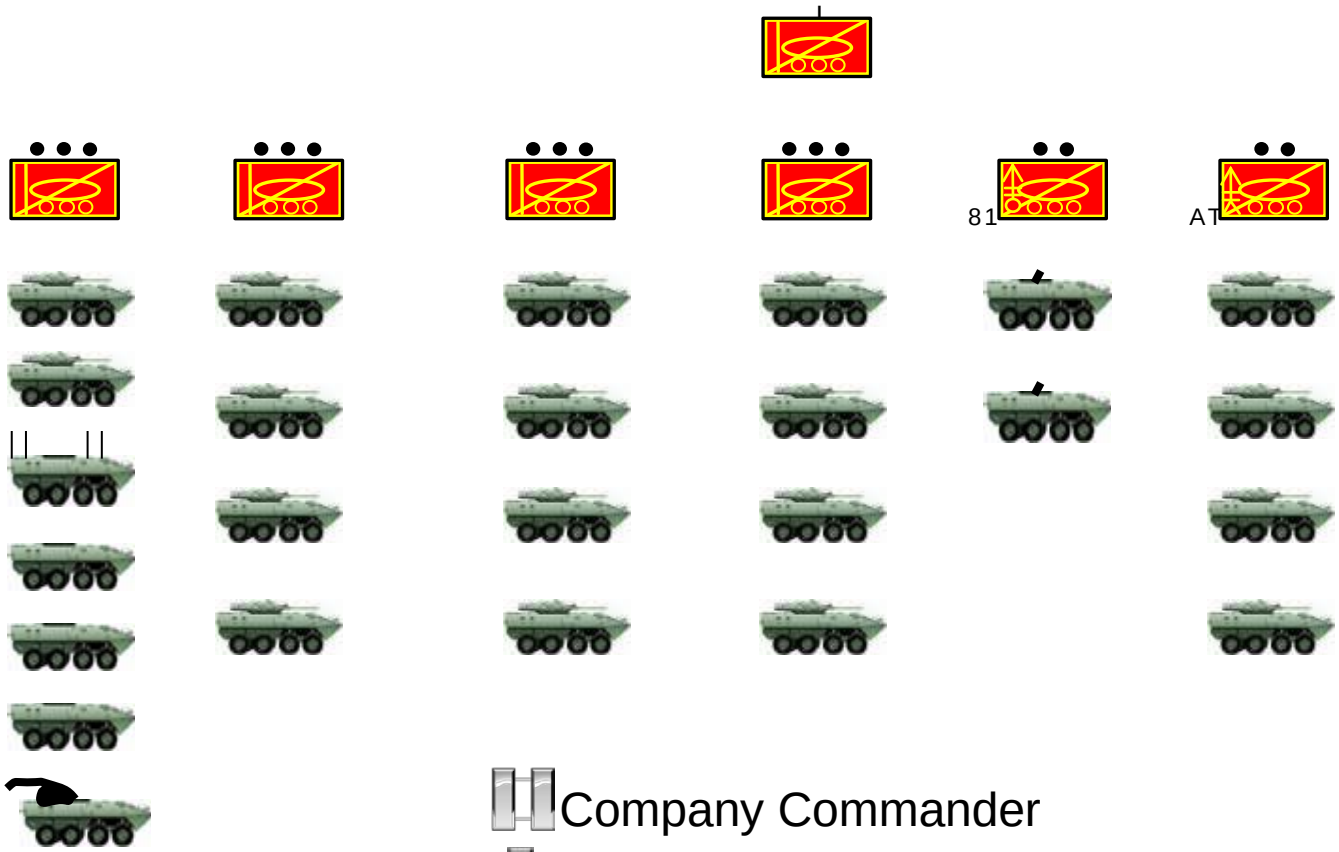
USMC Light Armored Reconnaissance Battalion: Relevance Across the Range of Military Operations

Task Organization



TF Total: 1428 Marines

Company Task Organization



Company Commander

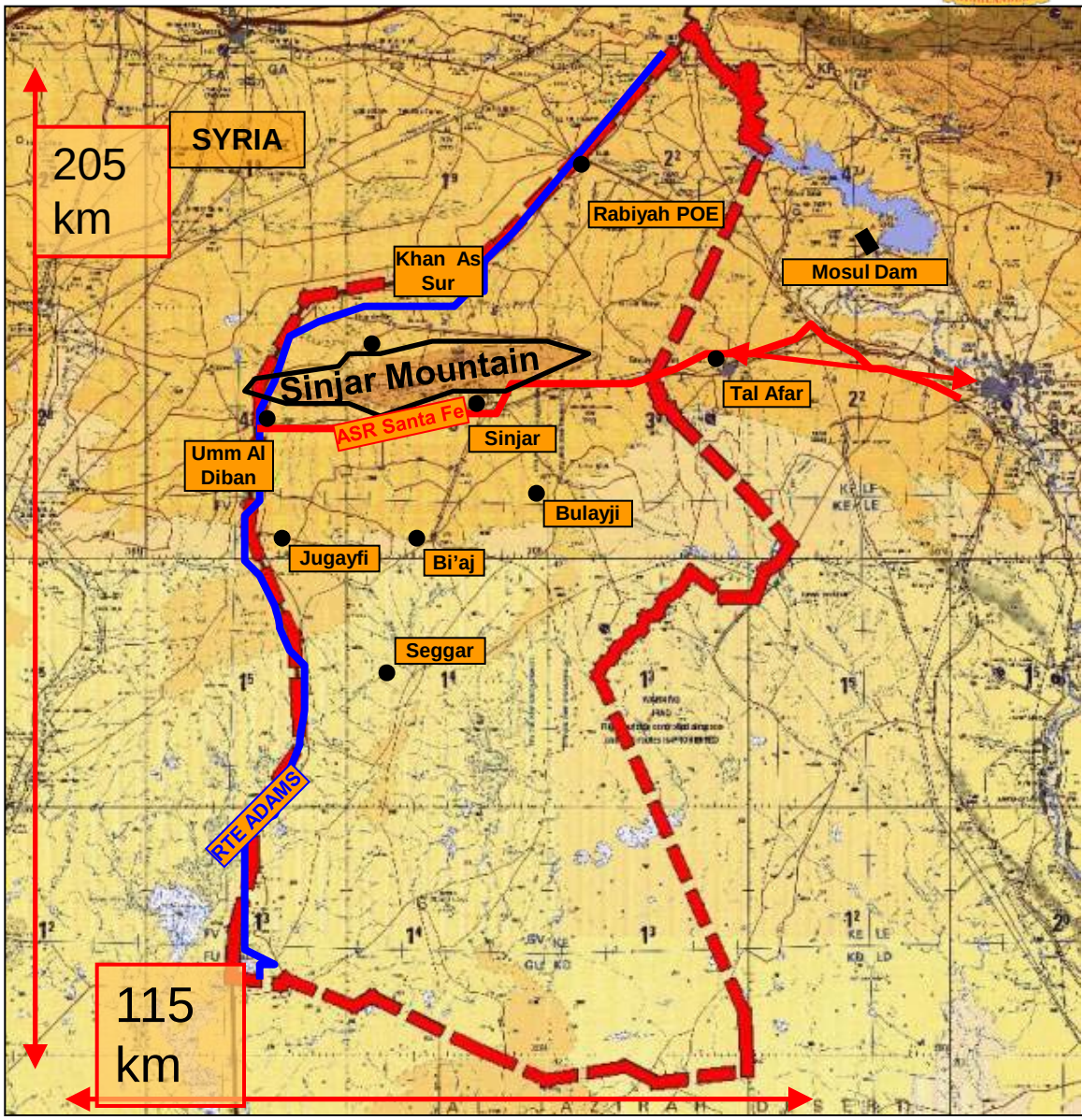
Company Executive Officer

Company 1st Sergeant

Company Ops Chief

TAO Tripoli Overview

- TAO TRIPOLI
  - Bordered by Syria to the (E)
  - 3 ACR to the West (Mosul)
- Turkey border is 6Km to the (N)
- Rawah 45Km to the South
- Approx 205 km x 115 km
- Sinjar Mountain
  - Largest terrain feature in TAO TRIPOLI
- POE Rabiyah is the only POE within TAO TRIPOLI
- ASR Santa Fe runs east to west through TAO TRIPOLI
- RTE Adams stretches the entire length of the border throughout TAO TRIPOLI
- Major Population Centers
  - Sinjar
  - Bi'aj



Operational Reach

- Total Miles Operated (1 Oct 2008 – 31 March 2009):
  - 465,782 Miles

- Total Hours Operated (1 Oct 2008 – 31 March 2009)
  - 45,473 Hours

Significant Operations

- Three battalion level un-partnered operations conducted
  - Bulayj
  - BOBs
  - Iraqi National Election Security
- Three partnered operations conducted with 11th BDE, 3rd IA
  - OP Dark Shadow
  - OP Dark Shadow II
  - OP Chaban Region
- IA/IP units in Ninewa Province more advanced than their counterparts in Al Anbar Province.

Lessons Learned

- Electric Laser Range Finder (ELRF) Failures
  - Discrepancies identified and fixed with a PM-LAV Contact Team in country
- Command and Control
  - Tied to G-SWANs with no mobile capability
- Long Range Communications
  - Platoons talked on SATCOM, BFT, Iridium
  - SATCOM Data (HPW) at the platoon-level

Maintenance Trends/Issues cont.

- Hull:
  - Engines: Replaced 28
  - Starters: Replaced 15
  - Differentials: Replaced 14
  - Crew Heaters: Replaced 35
  - Drivers DVE Sensor: 41
  - Head Gaskets replaced: 22
  - Planetaries rebuilt: 22

LAV BPUP Survivability

Questions?

TACOM
Life Cycle Management Command

2009 Combat Vehicles Conference

SHAPING TOMORROW'S COMBAT VEHICLE PROGRAMS IN TODAY'S VOLATILITY

Presenting: Mr. Michael Viggato
Deputy to the Commanding General

13 Oct 2009

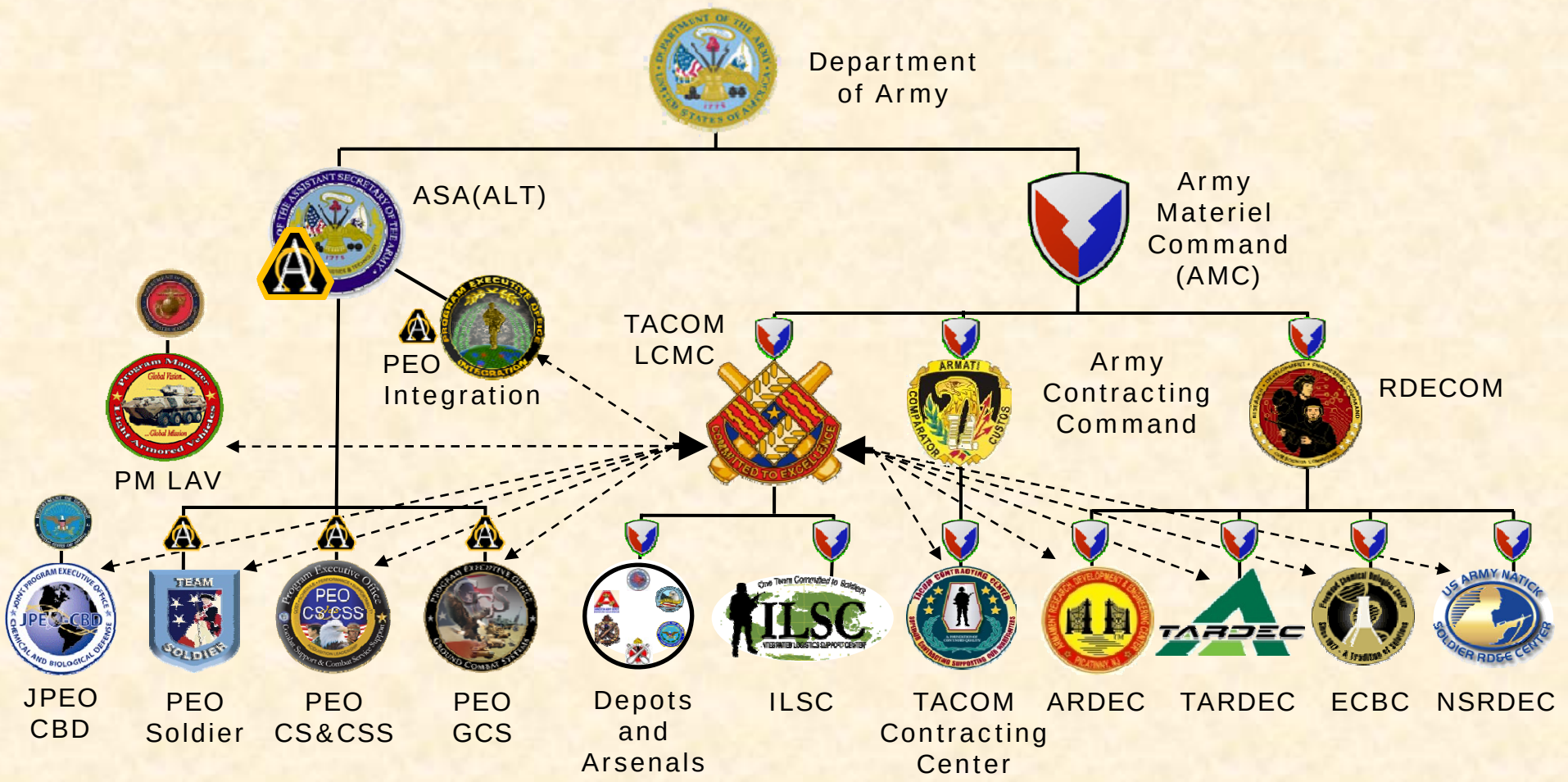
Major General Scott West
Commanding General

TACOM LCMC
Vision and Mission

VISION: Providing our warfighters overwhelming lethality, survivability, mobility, and sustainment for battlefield dominance, now and in the future

MISSION: Develop, acquire, field, and sustain Soldier and ground systems for the warfighter through the integration of effective and timely Acquisition, Logistics, and cutting-edge Technology (AL&T)

TACOM LCMC Organization



TACOM LCMC
Our Priorities

Support to our Warriors

Strengthen the LCMC

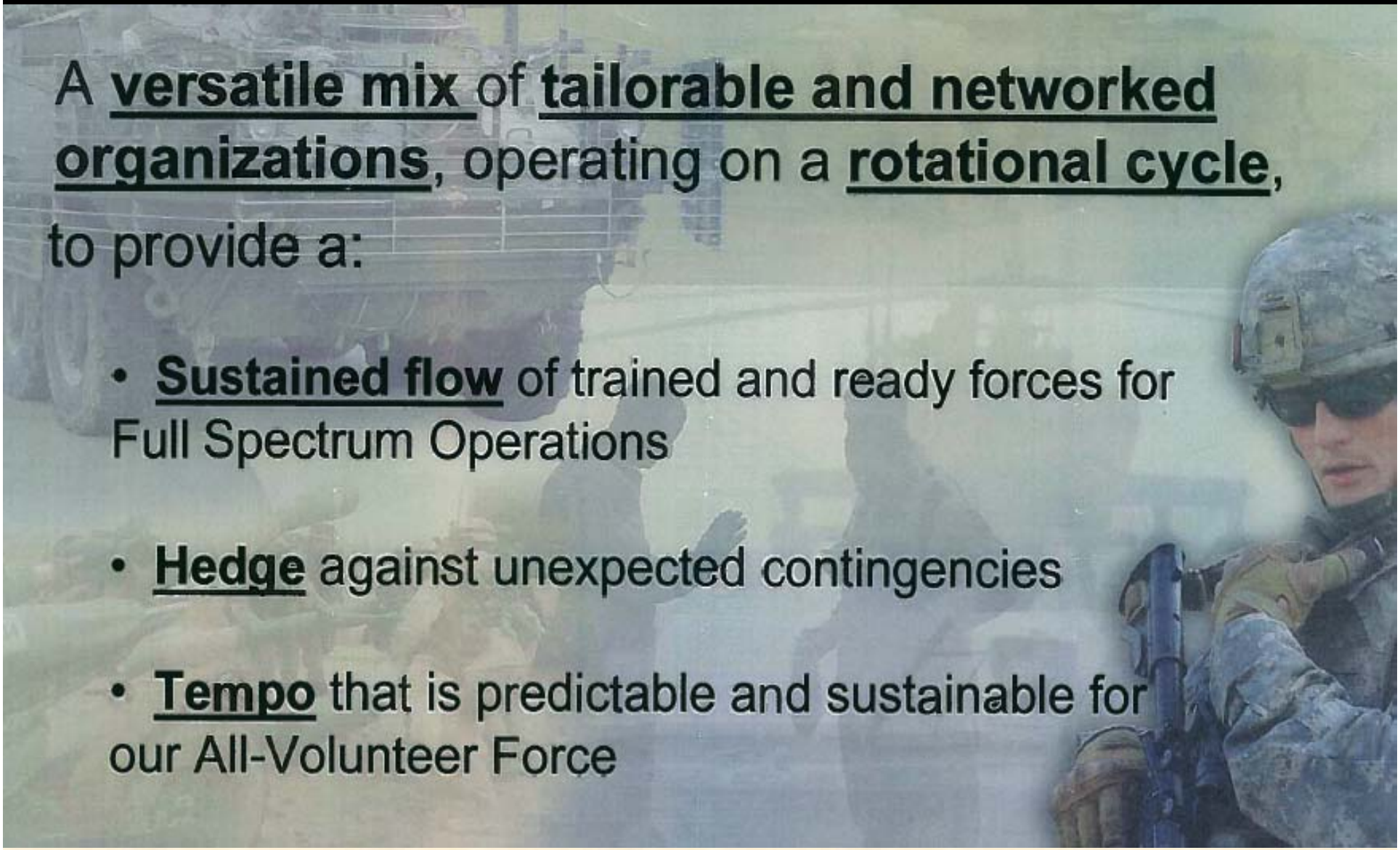
LMP **Modernization** | **Transform** | **Industrial Base** **BRAC**

Armed Forces Day & BRAC Ground Breaking

Strengthen Ties to the Community

2009 TACOM LCMC Army Ball

TACOM LCMC ARFORGEN



TACOM LCMC ARFORGEN

		RESET	TRAIN - READY	AVAILABLE
ACTIVITY		Recovery From Deployment	Full Spectrum Training / Prepare for Deployment	Deployed or Available for Deployment/ Engagement
READINESS LEVEL		Not Ready	Manned and Equipped at C2 Levels to C1 Levels	Manned and Equipped at C1 level
AVAILABILITY		> 180 Days	90-180 Days	Available
FORCE PACKAGE	1 Corps HQ Remainder of RC Forces	1 Corps HQ 4 Div HQs 20 BCTs ~92K Enablers	1 Corps HQ 5 Div HQs 20 BCTs ~92K Enablers	1 Corps HQ 5 Div HQs 20 BCTs ~92K Enablers

TACOM LCMC Evolutions

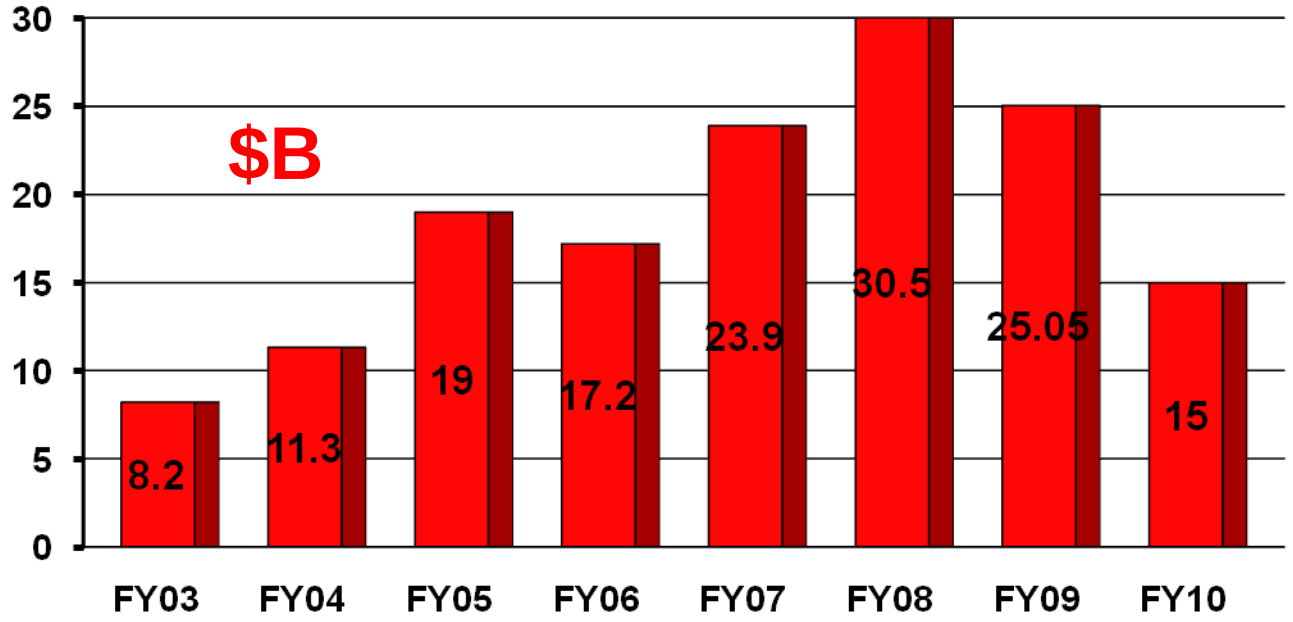
TACOM Life Cycle Management Command

GEN Casey:

"While continuing to fight the current conflicts, the Army also must adapt for future wars that will be fundamentally different than what I was trained to fight.

We'll build a BCT Model w/1 network; modernize w/capabilities packages @ 1 time; incorporate MRAPS; & build infantry vehicles."

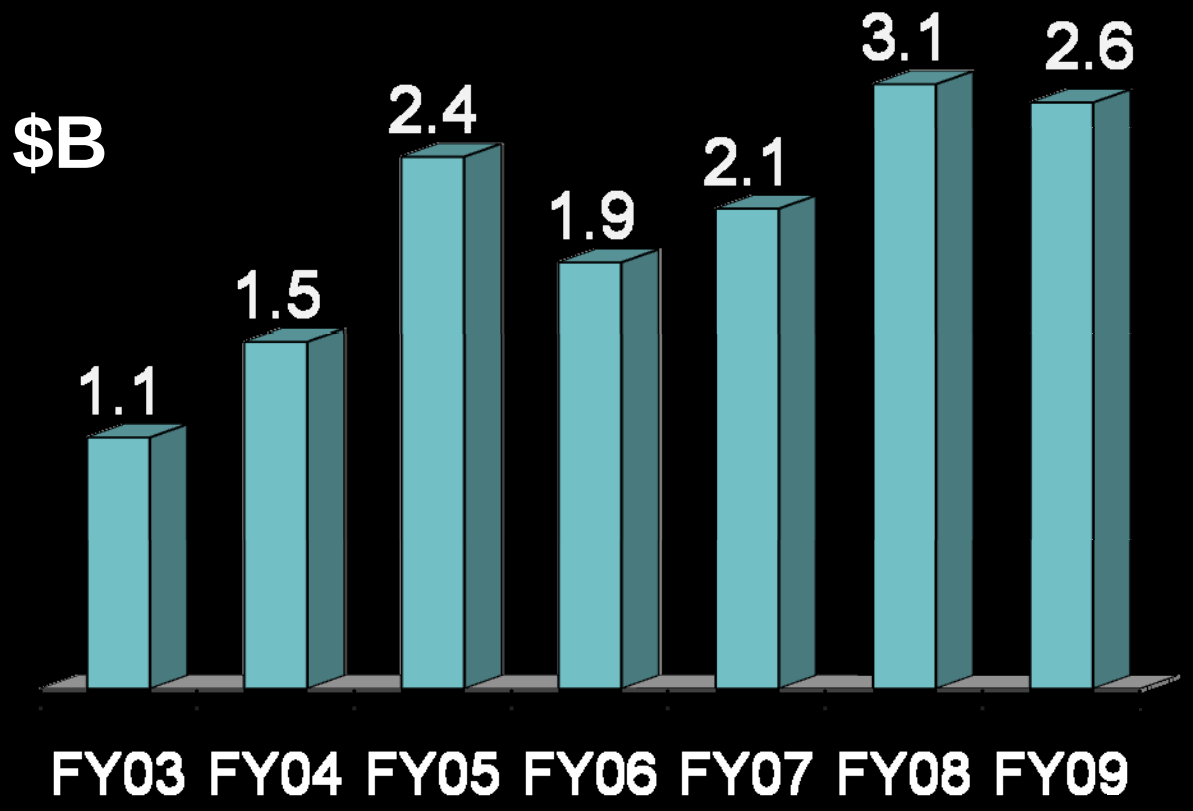
TACOM Contracting Center
Total Contract Dollars Historical and Projected



- FY09 Over 26,000 actions executed
- FY Projection includes supplemental funding est $800M
- The TCC administers over $100B in contracts

Annual Small Business Awards

FY03-FY09



TACOM LCMC
Bring Your "A" Game

Combat Vehicle Conference

BG David Ogg

13 Oct 2009

PEO Ground Combat Systems Organizational Structure

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

PEO BG David Ogg
DPEO Mr. Mike Asada

APEO Business Management
Mr. Art White

APEO Logistics
Mr. Ken Seibel

APEO Operations Management
Ms. Kristi Sharp

PEO XO
LTC Steven T. Wall

USMC LNO
Maj Stefan Sneden

ATEC LNO
Ms. Gretchen McCoy

APEO
Systems Engineering/
Chief Systems Engineer
Mr. Anthony Desmond

APEO Corporate Information
Mr. Don Papke

Heavy Brigade Combat Team
PM COL P. Lepine
DPM Mr. K. Houser

Stryker Brigade Combat Team
PM COL R. Schumitz
DPM Ms. C. Tucker

Lightweight 155MM Howitzer
PM Mr. J. Shields
DPM Mr. K. Gooding

Robotic Systems JPO
PM LtCol D. Thompson (USMC)
DPM Mr. J. Jaczkowski

KEY **Warren** **Picatinny**

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Program Executive Office Ground Combat Systems

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Stryker Brigade Combat Team

- Stryker Family of 10 vehicles

Heavy Brigade Combat Team

- Abrams Tank
- M88 Recovery Vehicle
- Bradley Fighting Vehicle
- Paladin / FAASV
- M113
- Knight

Joint Robotic Systems

(Army & Marine)

- X-bot
- MV-4
- TALON
- MARCbot

Joint LW Howitzer 155mm

Towed Artillery for the 21st Century

(Army & Marine)

- M777A2
- M119A2
- M198
- M111 IPADS

Vision:

"Be the premier Acquisition Organization by equipping Joint and Allied Forces with unparalleled lethal and survivable Ground Combat Systems"

Mission:

"Lead the Army's Ground Combat System Programs by providing the Joint Warfighter with mission capable systems as part of a full-spectrum force, through sound life cycle management"

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PEO GCS Portfolio

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Robotic Systems JPO

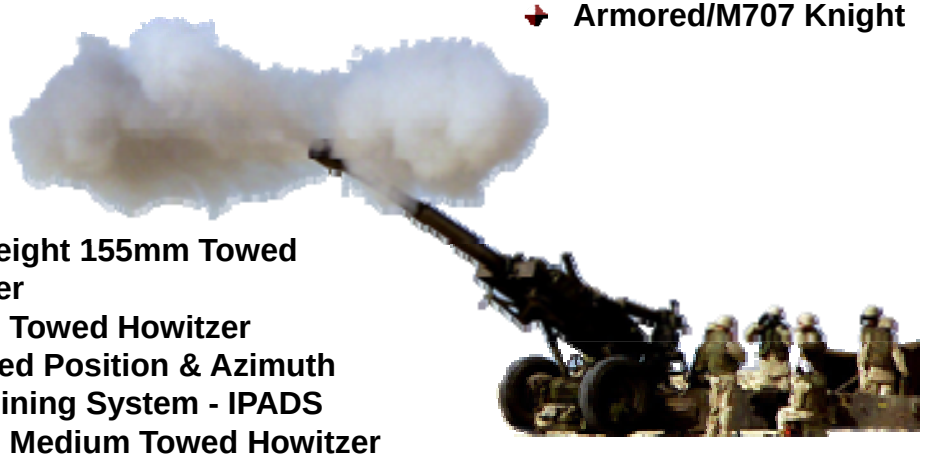
- UA Ground Systems
- Engineer Talon
- Gladiator
- MARCbot
- Packbot
- Assault Breacher Vehicle
- MV- 4 Flail

HBCT

- Abrams Tank
- M88 Recovery Vehicle
- Bradley Fighting Vehicle FOV
- M113 FOV
- Paladin 155mm SP Howitzer/FAASV
- Armored/M707 Knight

Stryker Brigade Combat Team

- Mobile Gun System
- Infantry Carrier Vehicle
- Medical Evacuation Vehicle
- Reconnaissance Vehicle
- Commander's Vehicle
- Engineer Squad Vehicle
- NBC Reconnaissance Vehicle
- Mortar Carrier
- Anti-tank Guided Missile
- Fire Support Vehicle



JLW 155 System

- Lightweight 155mm Towed Howitzer
- 105mm Towed Howitzer
- Improved Position & Azimuth Determining System - IPADS
- 155mm Medium Towed Howitzer
- Gun Laying and Positioning System

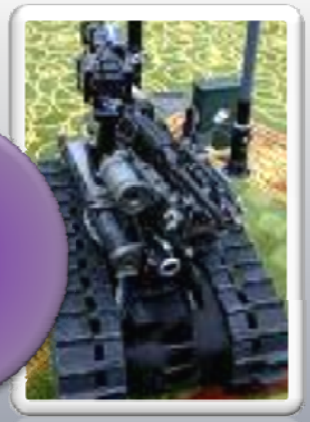
Supporting OCO & ARFORGEN

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

6,118 Abrams FoV

13,441 M113
6,452 Bradley

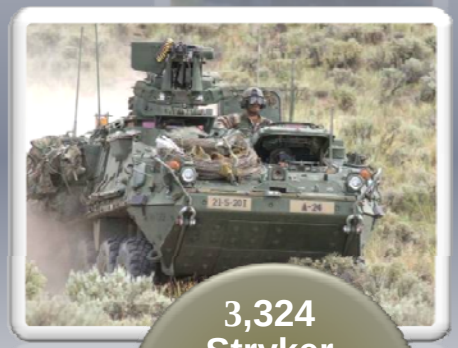
6,000 Robotic Platforms



In The Fight Today

- 410 Abrams
- 700 Bradleys
- 175 Fire Spt Platforms
- 645 Strykers
- 6000 Robots
- 150 JLW Howitzers

3,962 Fire Support Platforms



3,324 Stryker Platforms

1,800 Towed Cannons

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PEO GCS Modernization Tenets

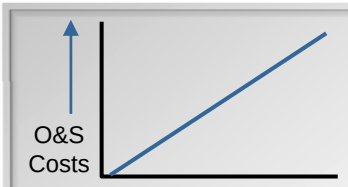
PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Facing Common Upgrade Challenges

Exceeding Weight Limits

Power Availability

Capability Needs

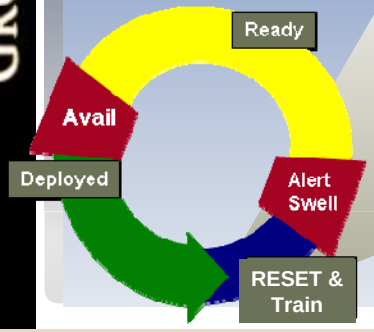


O&S Cost Increasing

Opportunity for Common solutions

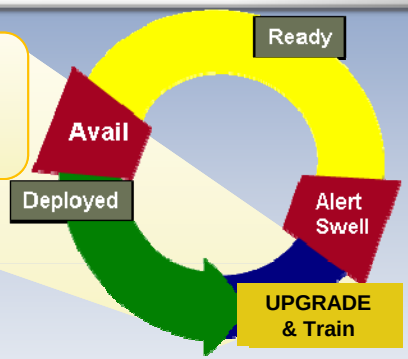
- Minimizing Development Costs
- Commonized Capability Across Fleets
- O&S Cost Benefits
- Increased quantities yielding procurement cost saving

Modernization Synchronized With ARFORGEN



RESET & Train

UPGRADE &Train



OUR MISSION IS OUR WARFIGHTERS' FUTURE

PEO GCS Modernization Approach

- **Systems Engineering Approach within a Fleet Context**
- **Coordination/Synchronization with other PEOs**
  - Interface development
  - Acquisition Strategy and Programmatics
- **Buy Back SWAP-C**
- **Ensure Sufficient Power, Energy, and Vehicle Electronics Backbone to support Army Modernization**
  - Battle Command and Transport Layer
  - Mission Equipment Packages
  - Vehicle Health Management and Embedded Training
- **Commonality Across the Fleet**
  - Component Level where Possible
  - Architecture level
- **Open Systems Architecture**

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

PM Heavy Brigade Combat Team (HBCT)

Paul R. Lepine
Colonel, Field Artillery
Project Manager

OUR MISSION IS OUR WARFIGHTERS' FUTURE

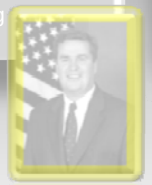
Heavy Brigade Combat Team

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Heavy Brigade Combat Team
PM COL P. Lepine
DPM Mr. K. Houser

Stryker Brigade Combat Team
PM COL R. Schumitz
DPM Ms. C. Tucker

Lightweight 155MM Howitzer
PM Mr. J. Shields
DPM Mr. K. Gooding



Robotic Systems JPO
PM LtCol D. Thompson (USMC)
DPM Mr. J. Jaczkowski

PM Abrams	PM Bradley / M113	PM Fire Support Platforms	PD Mounted Maneuver Foreign Military Sales

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Heavy Brigade Combat Team

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

PM Abrams

M1A2 SEP (1547)	M1A1 SA (958)	M88A1 (1035) M88A2 (607)	M104 (44)

PM Bradley / M113

M2/3A2 M2/3A2 ODS (2082)	M2/3A3 (2479)	M113A3 (3515)	M1064A3 (825)	M577A3 (1978)	M1068A3 (1010)

PM Fire Support Platforms

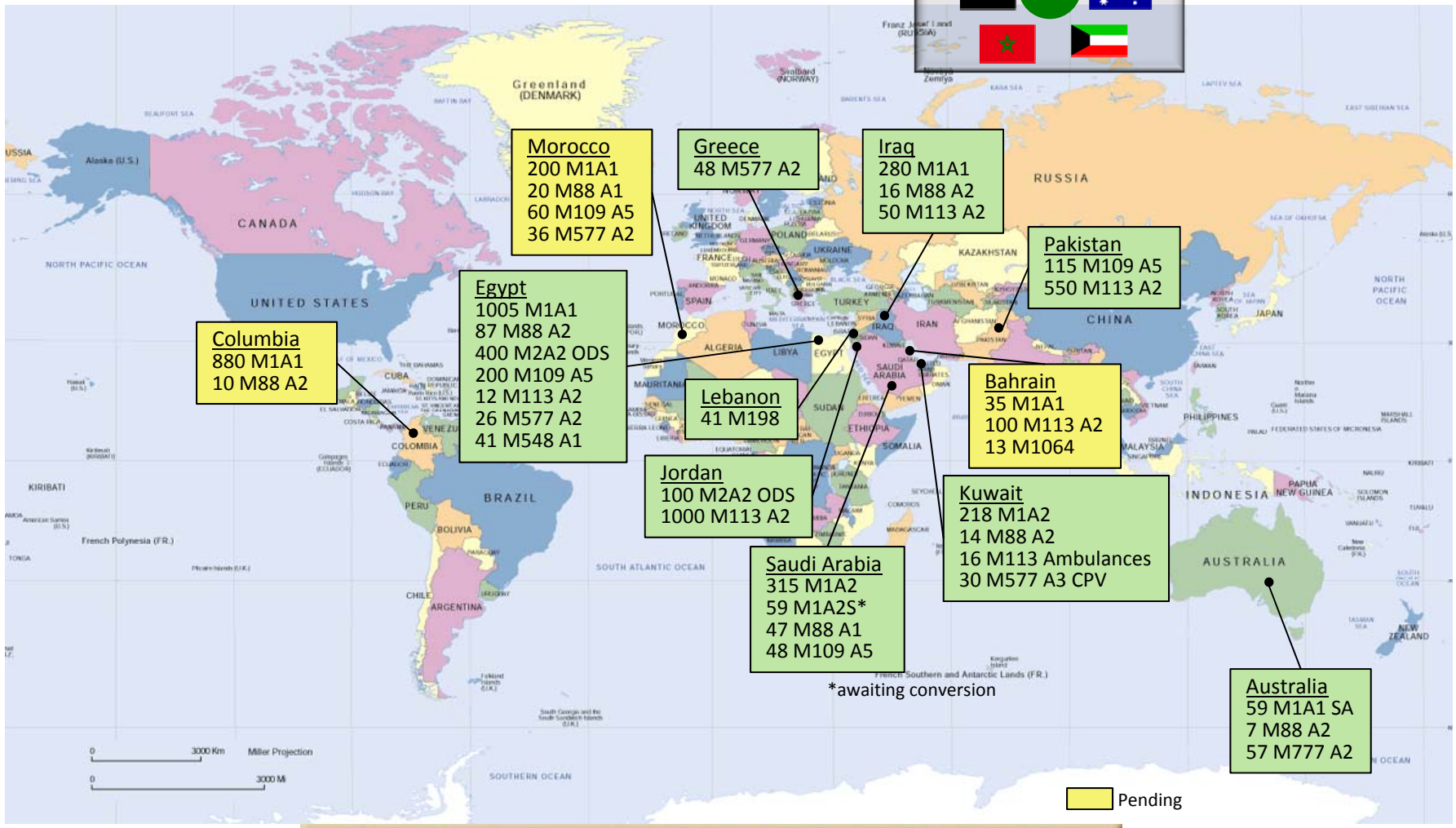
M109A6 (854)	M992A2 (804)	M3A3 BFIST (258)	M7 BFIST (158)	M1200 (490)

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PM HBCT FMS Cases
Active and Pending

PD Mounted Maneuver Foreign Military Sales

FMS



PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Abrams Projected Improvements

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Lethality

- Improved Target Recognition
- Improved Combat Identification
- Improved Ammo
- Improved Accuracy

Survivability

- Improved Fire Suppression System
- Improved Ballistic Protection
- Improved Situational Awareness

Sustainment

- More Reliable Power Train
- More Reliable Track and Road-wheels
- Embedded Vehicle Health Management System
- Improved Silent Watch

- Future Battle Command
- Improved CBRN System
- Improved IED Survivability

Develop an Integrated Fighting System that Will Overmatch Future Threats Across the Full Spectrum Warfare

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Bradley Projected Improvements

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

- Lethality
- Sustainment
- Survivability

Increased Lethality
Commander Self Defense Weapon
Combat Identification

Target Designation Aided Target Recognition

Improved Ammo

IED Electronic Counter Measures
JTRS/ FCS Spinouts
Signature Management

Improved IED Survivability
Improved Crew and Soldier Protection

Improved Rear Ballistic Protection
External Fire Suppression

Overhead Wire Protection
Spotlight

Improved Vehicle Health MGT & Embedded Electronic Technical Manuals

Environmental Conditioning

Improved Mobility

Rearward and Side Looking Vision Systems

Active Protection Threat Warning System

Develop an Integrated Fighting System that Will Complement Across the Full Spectrum Warfare

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Fire Support Platforms Priorities

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

PIM
RESET the BFIST, M109 FOV, and Knight
SYNC with ARFORGEN/ARI Alignment
Modularity
CREW Integration
Software Blocking
VHMS Strategy
Modernization

M109 FOV

(Sustainment)
PDFCS Fielding and Excalibur Integration

BFIST
FS3 Integration on A3 BFIST

M7 Upgrade to Bradley ODS-SA Configuration

KNIGHT
Execute the Armored Knight

Acquisition Strategy to Field 531 Systems Targeting Under Armor and on the Move

Our #1 Priority is to Support Units Engaged in Overseas Contingency Operation (OCO) and those Units Preparing to Deploy

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Paladin/FAASV Integrated Management (PIM)

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

- **Program Objectives**
  - Replace Obsolete Components
  - Ensure Long Term Sustainment
  - Reduce Log Footprint
  - Reduce Operations & Support Costs
  - Regain Mobility

- **Address Obsolescence and Sustainment Issues**
  - Leverage Bradley Fleet Commonality
  - Bradley Engine/Transmission/Final Drives/Track/Suspension
  - NLOS-C Electric Drive and Rammer

- **Maintain a 10-12 yr Fleet Age**
  - Improvements to power train, power management, rammer, slip ring, hydraulics, suspension and fire control
  - New chassis for Paladin and FAASV
  - Crew Survivability
- Vehicle Health Management System (VHMS),
- Common Modular Power System (CMPS)

Lethality
Sustainment
Survivability

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PROGRAM EXECUTIVE OFFICE
GROUND COMBAT SYSTEMS

Robotic Systems Joint Project Office
(RS JPO)

David C. Thompson
LtCol, USMC
Project Manager

Robotic Systems Joint Program Office

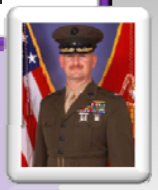
PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Heavy Brigade Combat Team
PM COL P. Lepine
DPM Mr. K. Houser

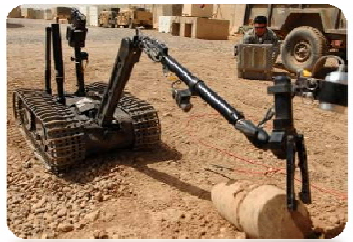
Stryker Brigade Combat Team
PM COL R. Schumitz
DPM Ms. C. Tucker

Lightweight 155MM Howitzer
PM Mr. J. Shields
DPM Mr. K. Gooding

Robotic Systems JPO
PM LtCol D. Thompson (USMC)
DPM Mr. J. Jaczkowski



X-bot	MV-4	TALON	MARCbot



OUR MISSION IS OUR WARFIGHTERS' FUTURE

Robotic Systems Portfolio

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Maneuver

- IED Defeat Systems
- Disarm / Disrupt
- Reconnaissance
- Investigation
- Explosive Sniffer

Maneuver Support

- Area/Route Clearance
- Mine Neutralization
- Counter IED
- CBRNE

Sustainment

- Common Robotic Kit
- EOD
- Convoy
- Log/Resupply

OUR MISSION IS OUR WARFIGHTERS' FUTURE

RS JPO Joint Robotic Repair and Fielding Activities in OIF/OEF

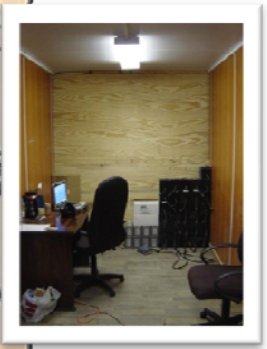
Iraq
-13 Soldiers/Marines
- 8 civilians
- 1700+ robots

Afghanistan
-11 Soldiers/Marines
- 1 civilian
- 800+ robots

Camp Speicher

Al Taqaddum Airbase

Kandahar Air Field

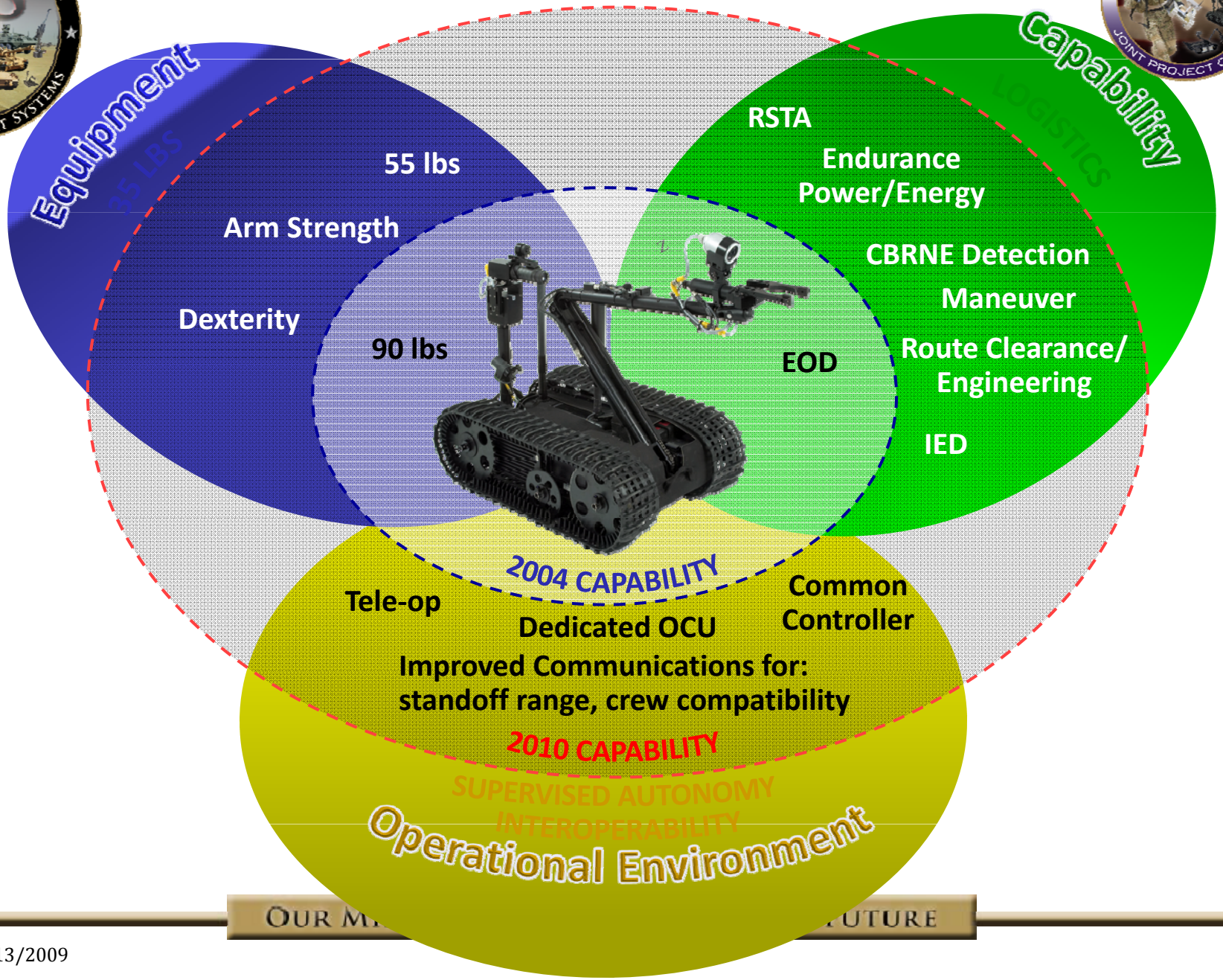


Camp Leatherneck

Material Enterprise Challenges & Opportunities

- **Establish a concerted materiel enterprise strategy that balances both current and future requirements**
- **Deliver fully integrated ALT capabilities to the Joint Warfighter**
  - AMC empowered RS JPO with theater sustainment of ground robots: Joint Robotic Repair and Fielding Activity
  - Partnered with RDECOM and other Service labs for appropriate technical expertise (ie. TARDEC for vehicle integration, ARDEC for weapons)
- **Must account for the sustainment and modernization of the current force, spinouts and other technology transfers to the current force and BCTs**
- **Two add'l issue/challenges:**
  - No centralized robotics strategy/disparate pots of resources
  - Configuration Management – multiple organizations "touch" robots

Robotic Modernization



PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Family of Robotic Systems
Payload Integration and Interoperability

Common payload interface across platforms by mission or class

Family of unmanned ground systems

MISSION EQUIPMENT PAYLOADS

Payload A **Payload B** **Payload C** **Payload D** **Payload E**

Payload Interface Standard Architecture

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

PROGRAM EXECUTIVE OFFICE
GROUND COMBAT SYSTEMS

PM Stryker Brigade Combat Team (SBCT)

Robert W. Schumitz

Colonel, IN

Project Manager

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Stryker Brigade Combat Team (Family of Vehicles)

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Heavy Brigade Combat Team
PM COL P. Lepine
DPM Mr. K. Houser

Stryker Brigade Combat Team
PM COL R. Schumitz
DPM Ms. C. Tucker

Lightweight 155MM Howitzer
PM Mr. J. Shields
DPM Mr. K. Gooding

Robotic Systems JPO
PM LtCol D. Thompson (USMC)
DPM Mr. J. Jaczkowski

NBCRV	ATGM	MEV	ESV	FSV
				

ICV	RV	MGS	MCV	CV
				

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Stryker Family of Vehicles

NBC Reconnaissance Vehicle (NBCRV) - 3

Anti Tank Guided Missile (ATGM) - 10

Infantry Carrier Vehicle (ICV) - 130

Commonality

Common Operating Picture
Common Chassis & Drive Train
Common KPP's
Common Survivability
Common TMDE, Spare Parts, Tools & Skills

Medical Evacuation Vehicle (MEV) - 16

Reconnaissance Vehicle (RV) - 52

Bottom Line

Stryker provides enhanced, Battle-proven capabilities to warfighters
Over 25 million miles in Combat
Currently on 11th SBCT Deployment

Engineer Squad Vehicle (ESV) - 13

Mobile Gun System (MGS) - 29

120mm Mounted Mortar Carrier (MCV) - 37

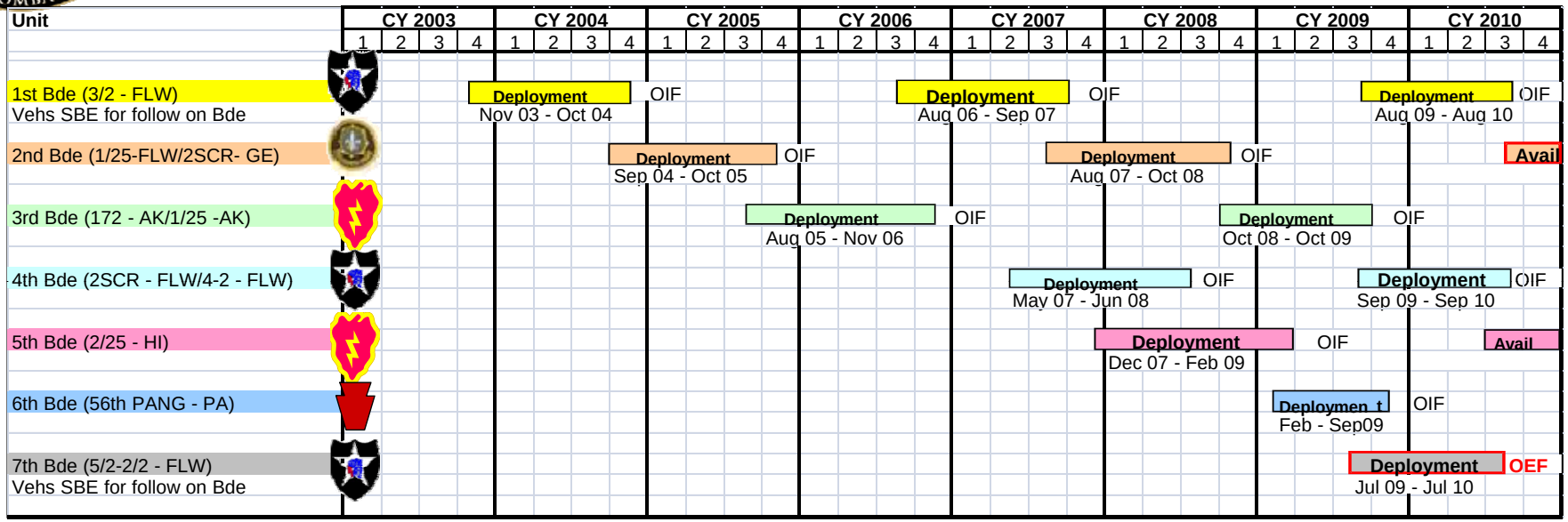
Commander's Vehicle (CV) - 28

Fire Support Vehicle (FSV) - 14

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Deployment History and Future
CY2003 – CY2010



Year (CY)	CY03	CY04	CY05	CY06	CY07	CY08	CY09	CY10
Average Miles Per Year	0.5 M	3.3 M	3.1 M	3.8 M	4.4 M	4.5 M	TBD	
Average Number of Stryker Vehicles	330	330	330	330	495	825	910	910
Average Number of Soldiers in Stryker Vehicles	2,310	2,310	2,310	2,310	3,465	5,575	6,370	6,370

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

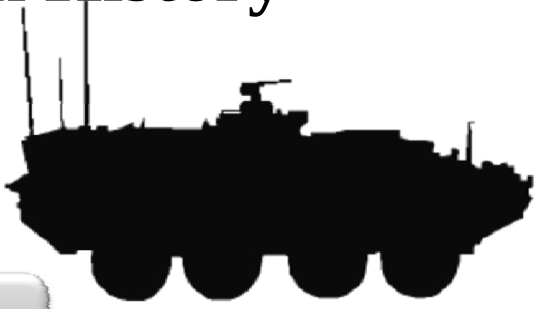
Stryker FoV Modernization History

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Jul 09

May-July 09
SMOD Concept/Requirement Trades PM &TCM

Stryker FoV CSB/IPR



TDS in Army Staffing & TES in OSD Staffing

May 09 VCSA MGS Brief

MGS Long Term mitigation deficiencies tied to Stryker MOD; Go forward to Stryker MOD IPR

DoDI 5000.02 Updated – TDS impact

Apr 09
SMOD Trade Study Concept

Dec 08 MGS CSB

Added three requirements from proponent to the ADM deficiency mitigation efforts

- Support to fund an additional $67M required for Long-Term MGS deficiency mitigation efforts tied to Stryker Modernization for FoV
- DAE Tasked - Update TDS/TES and return in 60 days for MS A Credit

Sep 08
DAE Update

- Subsystems/Integration Concepts with 1.2 billion possible combinations
- TRL 6 or higher
- SE Process yields best concept

Jan 08 – AAE recommends authorization of FY 08/09 RDT&E funds to conduct Pre-MS B activities

Nov 07
PM SBCT CSB

Feb 08
MGS DAB

Mar 08

May 08
Army Stopped SPIP but continue analysis

Aug 08 MGS ADM

DAE provides S-PIP authority to fund $10M for:

- ❑ Mod/Sim
- ❑ Spec Development
- ❑ Independent BCA
- ❑ Requirements Validation

- Correct MGS Deficiencies
- Convene an MGS CSB
- Authority to produce 62 MGS Vehicles

OUR MISSION IS OUR WARFIGHTERS' FUTURE

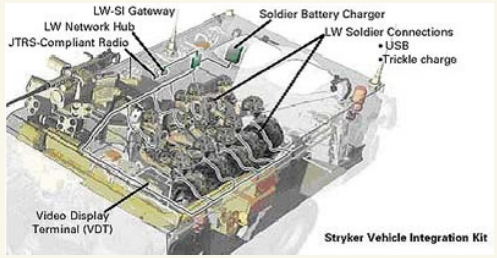
Stryker Constraints

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

SPACE

- Multiple Appliqué solutions added "Scaleable / Kitable Concept" limited
- Kits create both interior & exterior challenges for each carrier variant
  - CREW, GSS/MSS, Armor Upgrades
  - Additional displays/screens
  - 2nd/3rd order effects include weight and power
- Egress

WEIGHT



- Kits required to address threats
  - IED, RPG, EFP, Sniper, etc
- Only select Kits can be applied
- Deployed configuration weighs more than planned
  - ICV by ~11,000 lbs
  - MGS by ~9,000 lbs
- Safety Speed limits apply over 41,000lbs

POWER

- OIF kit loads require some systems to be turned off
- Current Power Generation cannot meet expected future loads
- Silent watch capability impacted
- Excess heat impacts both onboard electronics and Soldiers effectiveness

Current Space, Power and Suspension Capacity Shortfalls require Plans for Future Growth

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Balancing Capabilities Stryker Modernization (S-Mod) Systems Engineering Process)

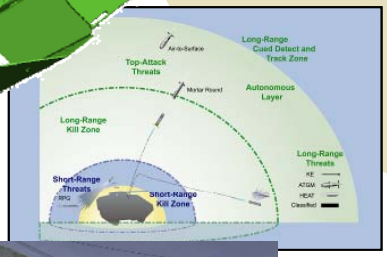
PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

Lethality

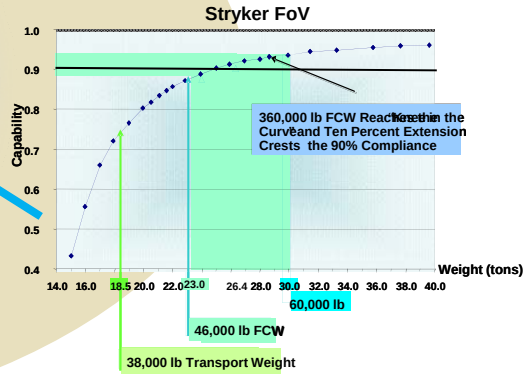
Mobility

Transportability

Survivability



Space/Weight/Power



C4ISR

Sustainment

Comprehensive System Design results in Balanced Technical Approach

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Combat Vehicle Conference

PROGRAM EXECUTIVE OFFICE
GROUND COMBAT SYSTEMS

Backup Slides

M1200 Armored Knight Program

- The M1200 Armored Knight provides Combat Observation Lasing Teams (Colts) with a highly survivable platform for the battlefield

- Targeting Under Armor/On the Move effort underway to increase survivability of targeting station operator and lethality of self-defense weapon

- 135 – Armored Knights fielded through September 2009

- Ongoing ECP's/MWOs address increased survivability

Lethality
Sustainment
Survivability

Modularity End State is 490

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

BFIST Program Overview

- **Targeting Under Armor/On the Move effort underway to increase survivability of targeting station operator and lethality of self-defense weapon**

- **BFIST SA Project**
  - Modified to align with the Bradley ODS-SA Project
  - Vehicle will be similar to an A3 BFIST without the CIV

- **FS3 integration on A3 BFIST**
  - Government testing started Jun 09
  - Limited User Testing scheduled Jan-Feb 2010

- **Bradley Urban Survivability Kits II (BUSK II) applicable to BFIST**
  - New FSSO seat testing accomplished successfully Jun 09
  - Chillers scheduled for delivery to AO Dec 09

- **Under Bradley Reman and Reset, Fielding of BFIST vehicles continue to meet ARFORGEN**
  - Support to Bradley reliability improvements to quickly correct Mission Critical failures
  - System / MEP obsolescence and upgrade efforts cut into production and fielding

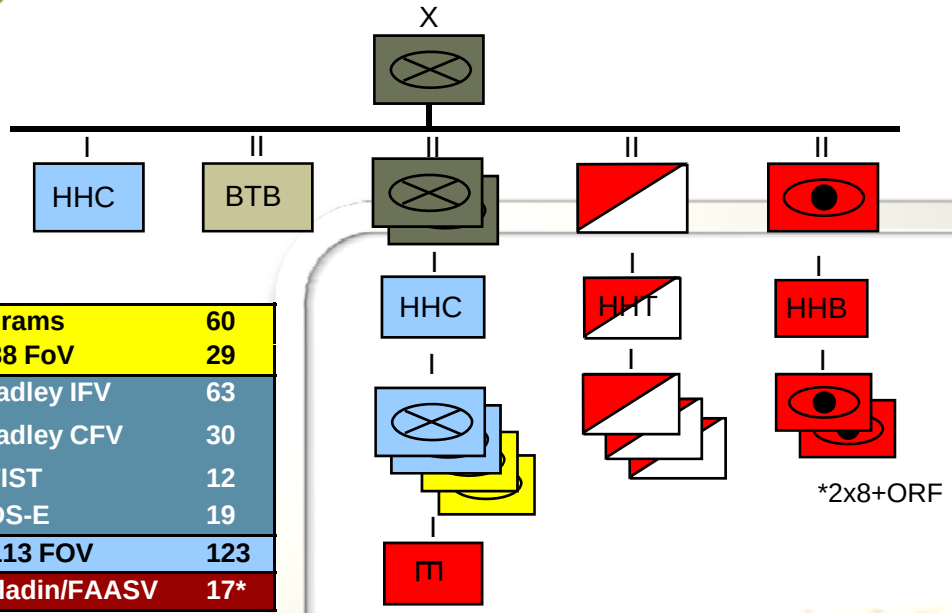
- **Bradley BFIST Desktop Trainers (BBDT)**
  - Changes to improve the soldier's training experience are being finalized for delivery Sep 09.

Lethality
Sustainment
Survivability

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Heavy Brigade Combat Team Formation



Abrams	60
M88 FoV	29
Bradley IFV	63
Bradley CFV	30
BFIST	12
ODS-E	19
M113 FOV	123
Paladin/FAASV	17*

19 Active Component
7 Reserve Component
3 Army Prepositioned Stock
2 Equipping Force Pool

31 Total HBCTs

PROGRAM EXECUTIVE OFFICE GROUND COMBAT SYSTEMS

OUR MISSION IS OUR WARFIGHTERS' FUTURE

AMERICA'S ARMY: THE STRENGTH OF THE NATION™

DEPUTY CHIEF OF STAFF G-8

UNITED STATES ARMY

NDIA Combat Vehicles Conference

13 October 2009

LTG Stephen Speakes, Army G-8

UNCLASSIFIED

U.S.ARMY

SOLDIERS ★ FAMILIES ★ ARMY CIVILIANS

ARMY STRONG.℠

Purpose

To provide an update on the Army's Fiscal Plan

Agenda

- Period of Continuous Change
- Strategic Context
- The Army's Focus
- Refining the 21st Century Army
- Fiscal Landscape & Environment
- FY 11-15 Start Point
- Fiscal Context / POM 11-15 Azimuths
- Framing POM 11-17: Refining the 21st Century Army
- Army Challenges / Opportunities

Period of Continuous Change

- **Evolving state of economy**
- **Responding to immediate warfighter needs**
- **Ensuring the versatility to slide along the conflict spectrum**
- **Seeking grounded projections into the future – every two to five years**

Strategic Context

The War:

- **Undertaking a responsible drawdown from Iraq**
- **Building capacity to achieve U.S. objectives in Afghanistan**
- **Improving Soldier capability to ensure a decisive advantage**
- **Sustaining Reset through Overseas Contingency Operations (OCO) funding**

The QDR:

- **Force Mix**
  - *Move to middle weight*
- **Support for Special Operations**
  - *Increase general purpose support to Special Operations Forces*
- **Support for Security Force Assistance (SFA) Missions**
  - *Validate deployment of general purpose forces for SFA operations*

The Army's Focus

- **Now ➡ FY11**

  Getting the Army in Balance

- **FY11 ➡ FYDP**

  Refining the Army of the 21st Century

Imperatives

- **Sustain**
- **Prepare**
- **Reset**
- **Transform**

Refining the 21st Century Army

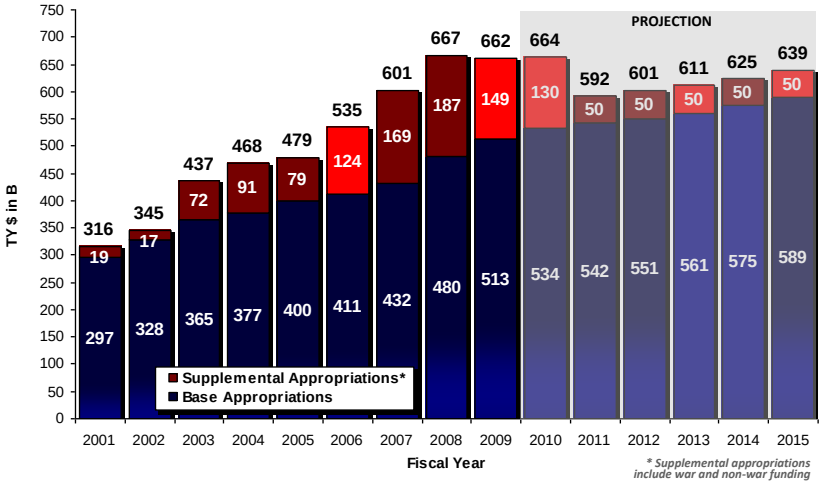
- A Balanced Army that can:
  - Prevail in Today's Protracted Counterinsurgency (COIN) Campaigns
  - Help Other Nations Build Capacity and Assure Friends and Allies
  - Support Civil Authorities at Home and Abroad
  - Deter & Defeat Hybrid Threats and Hostile State Actors

- Our goal is to build a **versatile mix** of **tailorable and networked organizations**, operating on a **rotational cycle**, to provide a **sustained flow** of trained and ready forces for **current commitments** and to hedge against **unexpected contingencies**, at a **tempo** that is predictable and sustainable for our All-Volunteer Force.

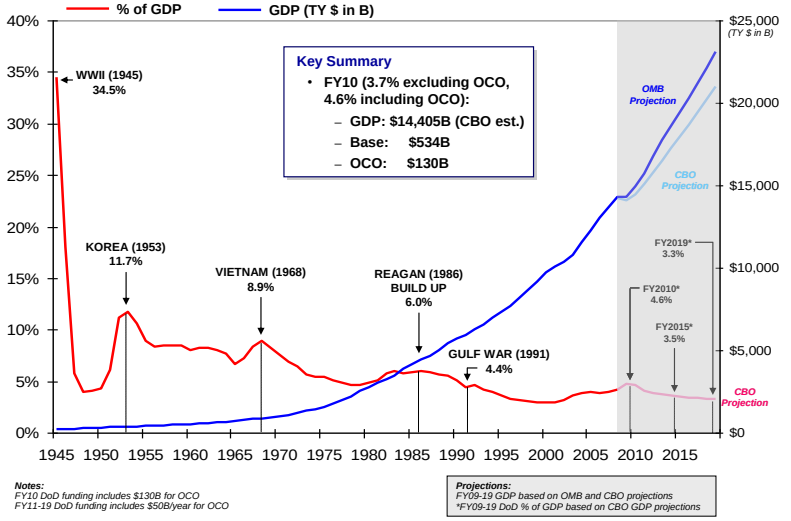
- General George W. Casey, Chief of Staff, Army

Fiscal Landscape

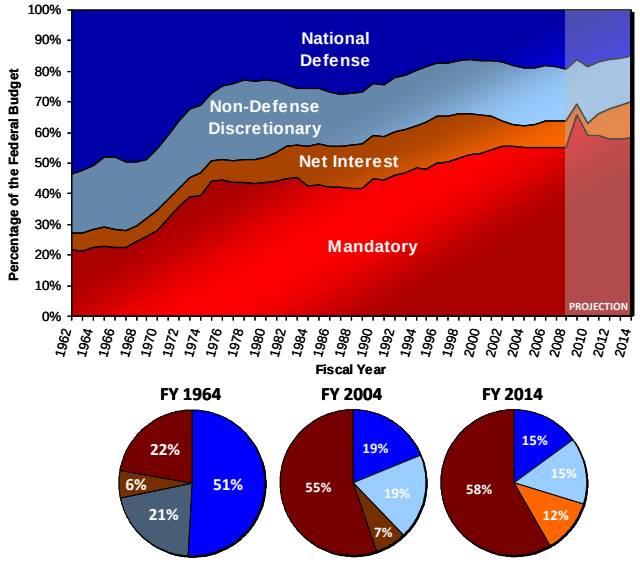
Defense Funding



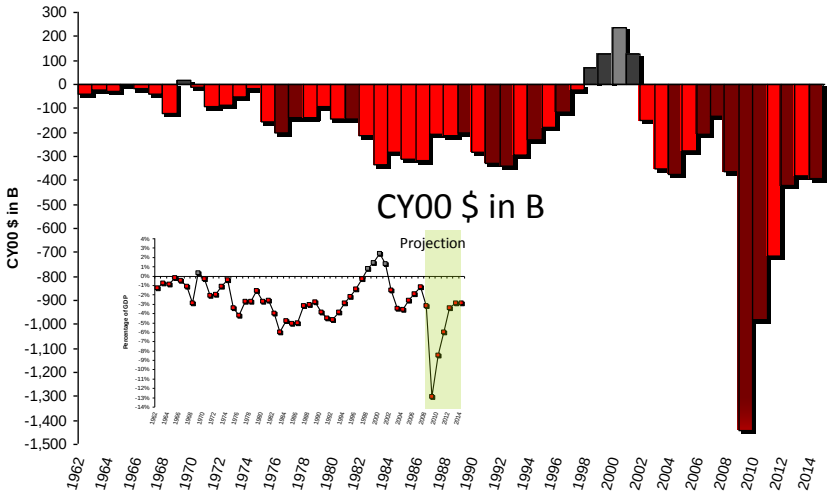
Defense as a Percentage of GDP



Federal Spending



Federal Deficit/Surplus

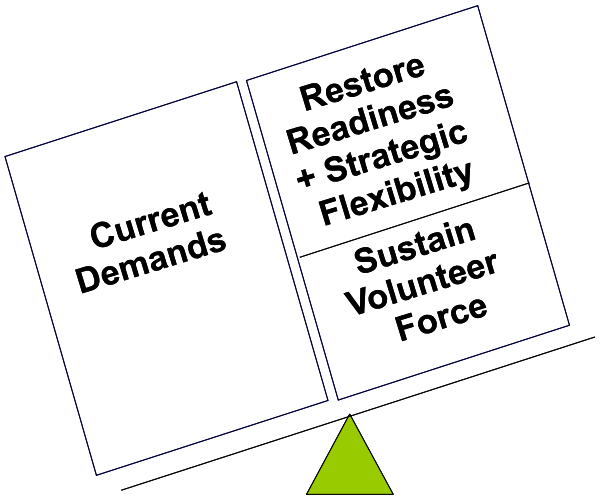


Our Dynamic Fiscal Environment

- **Outlook for Federal Budget**
  - *Facing record deficits and increasingly constrained resources*
- **New Administration**
  - *Changing the strategic direction for the Nation and conflicts in Iraq/Afghanistan*
- **New Direction for the Army**
  - *Restructuring modernization plans*
  - *Adapting institutions (e.g., ARFORGEN, Enterprise approach, equip strategy)*
  - *Experiencing increased health care/manpower costs*

FY 11-15 Start Point

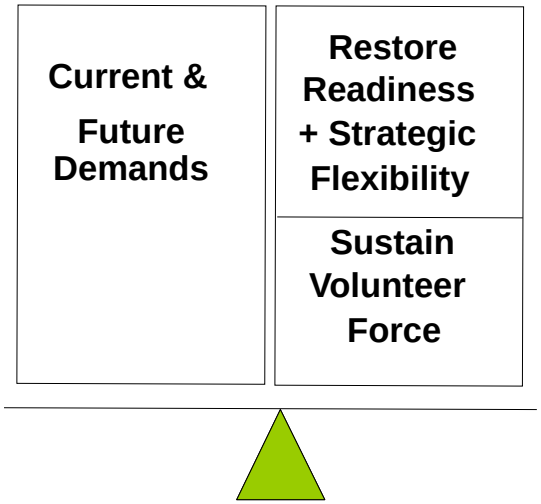
2007



Imperatives

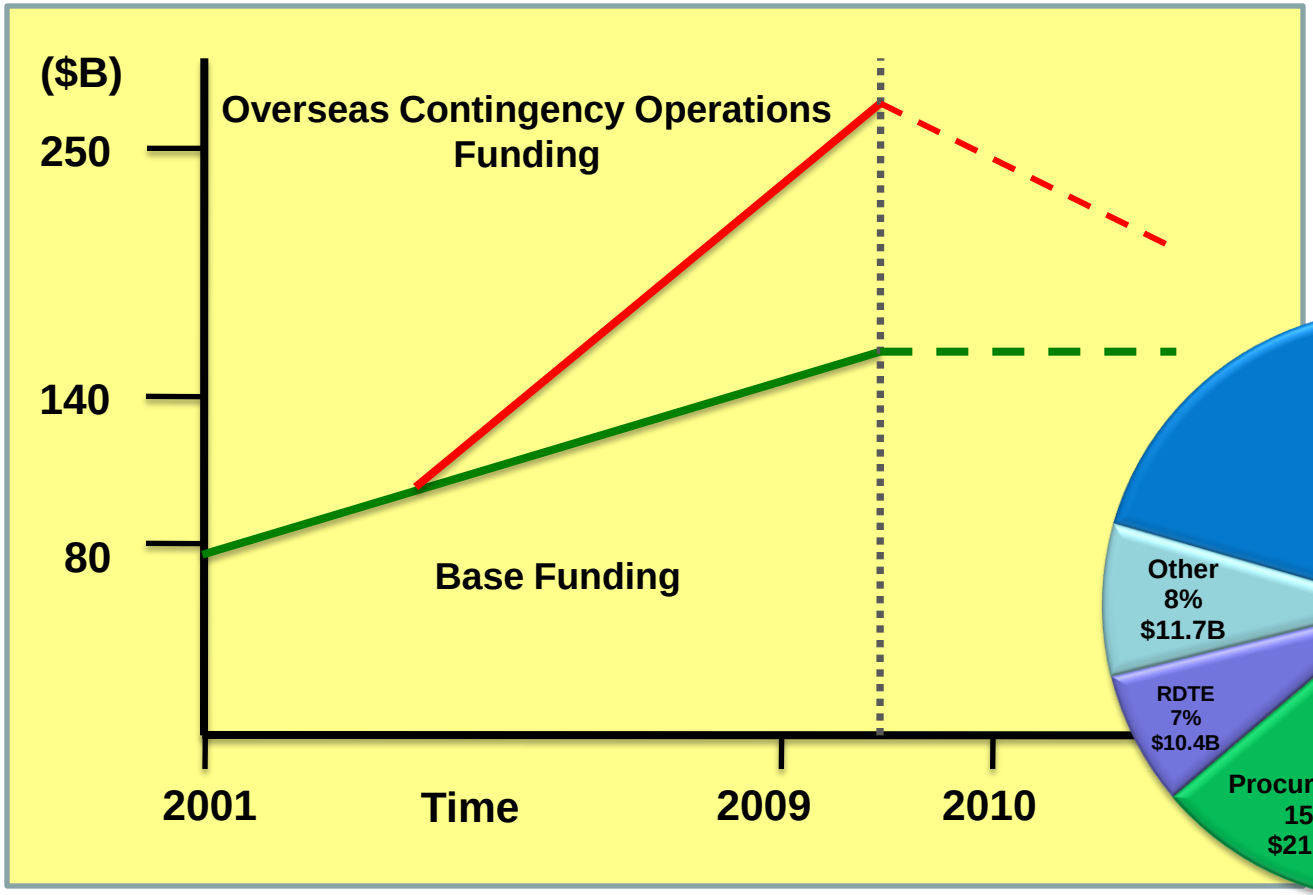
- Sustain
- Prepare
- Reset
- Transform

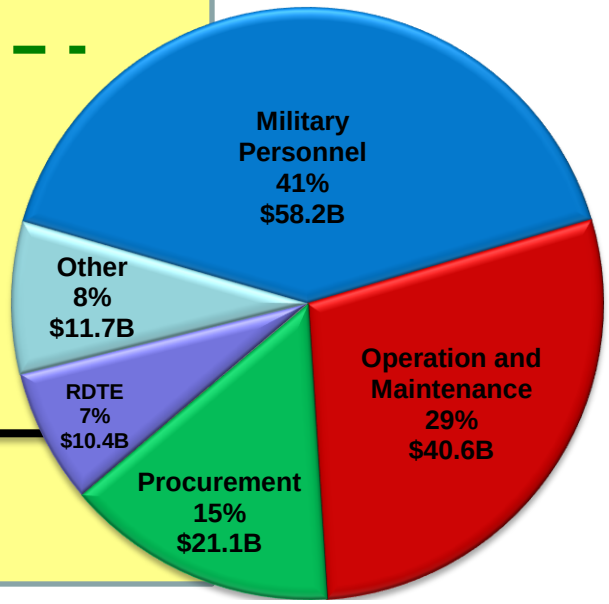
2011



- **Growth Completed**
- **Dwell ~ 1:2 for Active Component & ~ 1:4 for Reserve Component**
- **Base Realignment complete**
- **Modular reorganization complete**
- **Rebalancing complete**
- **Rotational readiness model implemented**
- **Strategic Flexibility Restored**

Fiscal Context





- Increasing investments in the All-Volunteer Force
- Balancing our modernization against what we can afford

POM 11-15 Azimuths

- **Sustains the All-Volunteer Force**
- **Completes BRAC Restationing**
- **Institutionalizes Army Force Generation Model**
- **Institutionalizes new Army Equipping Strategy**
- **Transforms the Modernization Strategy**

Setting the conditions to move the Army to a balanced force

Framing POM 12-17

Refining the 21st Century Army

- **Sustaining the All-Volunteer Force**
- **Revamping our Modernization Strategy**
- **Building Full Spectrum Capabilities**
- **Drawing Down our Forces in Iraq**
- **Resetting the Force**
- **Completing the Temporary End-Strength Increase**
- **Migrating from Overseas Contingency Operations to Base**

Army Challenges / Opportunities

- **Challenges:**
  - Sustaining the All Volunteer Force
  - Modernizing while fighting
  - Learning the right enduring lessons
  - Fielding warfighting capabilities to as many units as possible
  - Sustaining realistic, affordable, and adaptive modernization programs
- **Opportunities:**
  - Leveraging combat experience in the force
  - Using the energy of war to transform

Sustaining public support for our Army


Questions?

William E. Taylor
PEO Land Systems Marine Corps

"SHAPING TOMORROW'S COMBAT VEHICLE PROGRAMS IN TODAY'S VOLATILITY"

HYATT REGENCY . DEARBORN , MICHIGAN

Tuesday, 13 October 2009

Briefing Outline

- Who is PEO LS and how does it relate to MARCORSYSCOM?
- What Programs are in PEO LS and are there any opportunities?
- What does the QDR hold for the Marines Corps and its combat vehicle needs?

Mission Statement

"Program Executive Officer Land Systems (PEO LS) will meet the Warfighter's needs by devoting full-time attention to Marine Corps Weapon Systems acquisition, while partnering with Marine Corps Systems Command, in order to develop, deliver, and provide life-cycle planning for assigned programs."

Why PEO LS?

Because DOD INST 5000.02 directs it...

21 AUG 06
MROC establishes USMC PEO LS w/ matrixed concept."

→

5 FEB 07
PEO LS Charter Established

→

1 OCT 07
PEO LS (FOC)

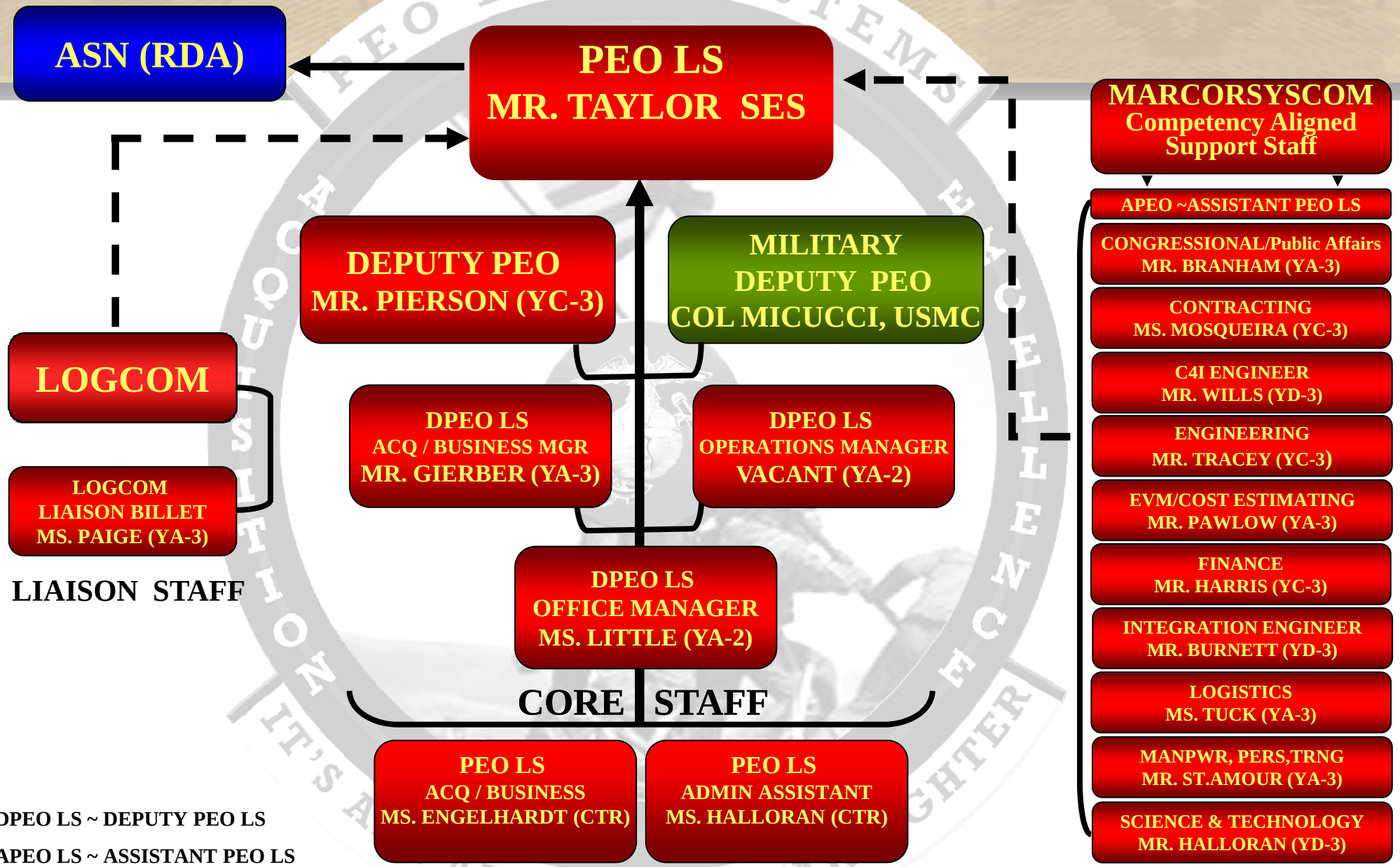
Established to enhance acquisition oversight and focus on an expanding Marine Corps portfolio of ACAT I & II ground and amphibious weapons systems.

Relationship to MARCORSYSCOM

- **PEO LS is a separate command reporting to ASN (RDA) but…collocated with Marine Corps Systems Command in Quantico, Virginia**
  - Similar to alignment between other DON PEOs and SYSCOMs
  - Leverages MCSC infrastructure & services
  - Operating Agreement approved 4 Apr 2007

- **Major SYSCOM Roles**
  - Manage / MDA for programs other than those assigned to PEO structure
  - Provide support services to PEOs without duplicating management responsibilities
    - Systems Engineering
    - Integrated Logistics Support
    - Contracting
    - Finance / Comptroller

PEO LS Organization



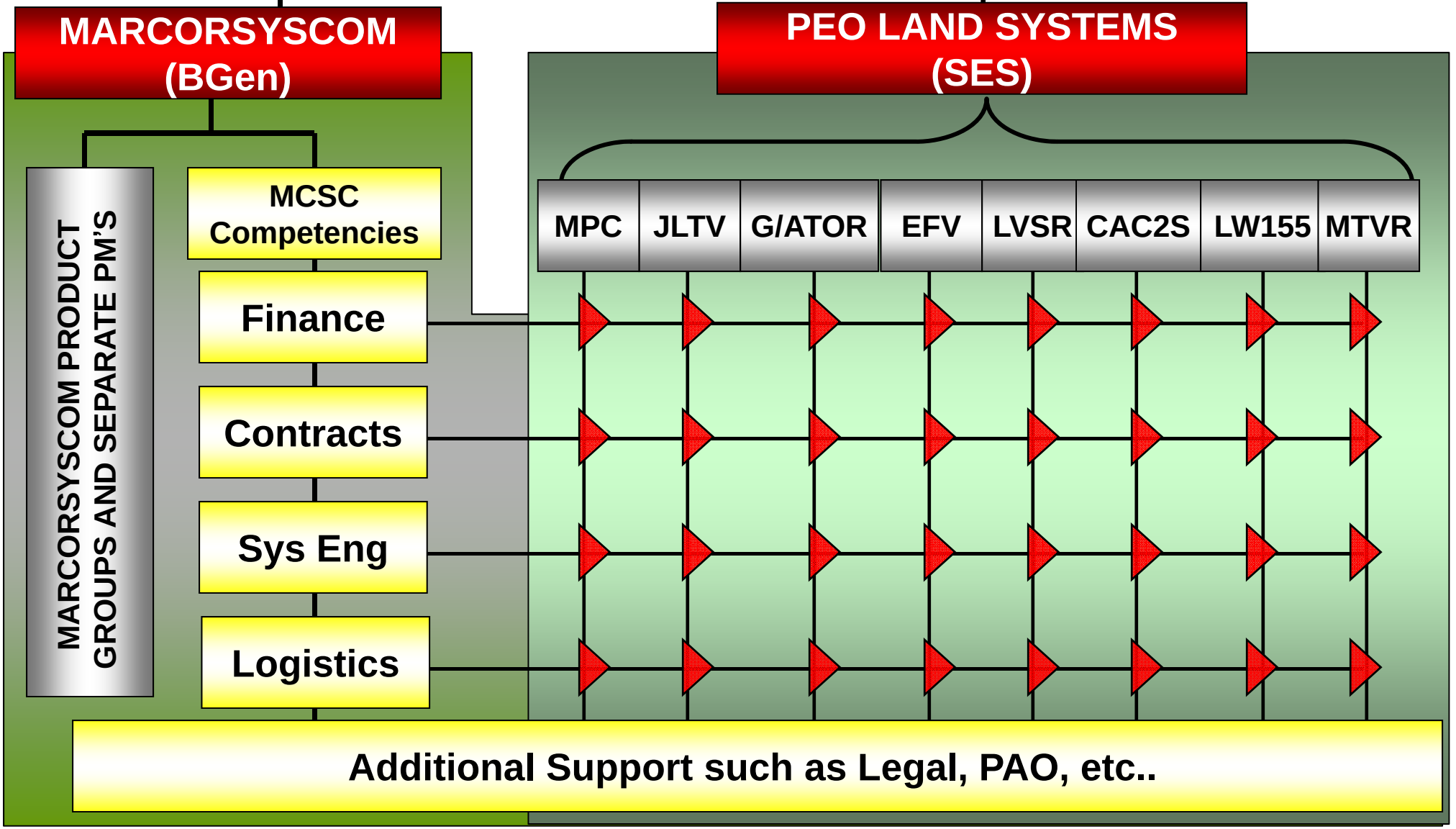
DPEO LS ~ DEPUTY PEO LS

APEO LS ~ ASSISTANT PEO LS

PEO LS PORTFOLIO IS *$9B *** CURRENT & FUTURE APPROPRI ATIONS**

CAC2S | EFV | G/ATOR | JLTV | LW155 | LVSR | MPC | MTVR

Competency Aligned Organization



Foundation

- **Use Lean Staff – Competency Aligned from MARCORSYSCOM**
- **Recruit from Diverse Sources – Familiar & Fresh**
- **Help MARCORSYSCOM Build Technical Authority and Standardized Processes**
- **Balance Oversight and PM "Command" Responsibility**
- **Innovate Against Program Risk, e.g., Implement Probability of Program Success**

Program Portfolio

Expeditionary Fighting Vehicle (EFV)

Logistics Vehicle System Replacement (LVSR)

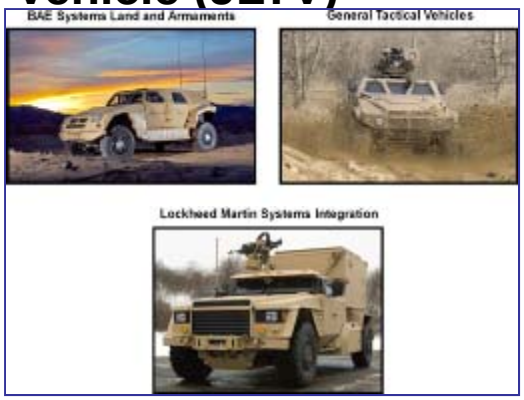
Medium Tactical Vehicle Replacement (MTVR)

Lightweight 155 (M777)

Marine Personnel Carrier (MPC)*

Ground Air Task Oriented Radar G/ATOR

Joint Light Tactical Vehicle (JLTV)



Common Aviation Command & Control System (CAC2S)

There are Opportunities

Concept Refinement	Technology Demonstration	Engineering, Manufacturing, Development	Production and Deployment

MS-A | MS-B | MS-C | IOC | FOC

Marine Personnel Carrier (MPC)*

Joint Light Tactical Vehicle (JLTV)

Expeditionary Fighting Vehicle (EFV)

Common Aviation Command & Control System (CAC2S)

Ground Air Task Oriented Radar G/ATOR

Logistics Vehicle System Replacement (LVSR)

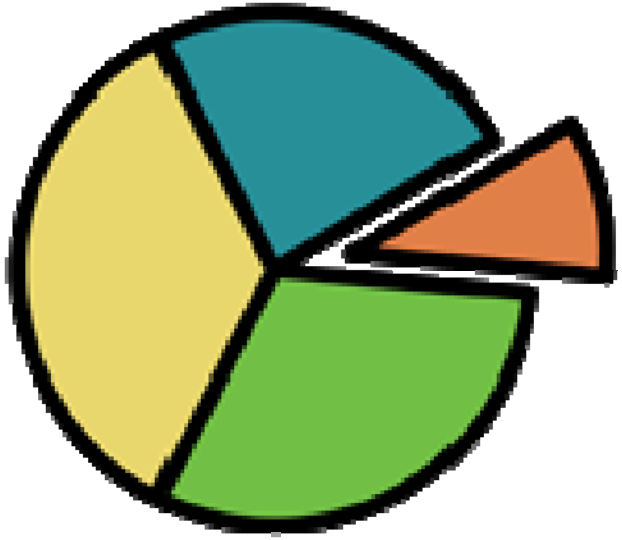
Lightweight 155 (M777)

Medium Tactical Vehicle Replacement (MTVR)

What to expect from the QDR

- **They will evaluate all aspects of DoD and the Marine Corps warfighting capability**
- **NO details as to what is coming…**
- **Bottom line… *no one knows the final outcome.***

But, we can't fiscally afford everything.



Questions?

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US Army (Retired)

A GREYBEARD'S PERSPECTIVE

The Army's Dilemma

How Many ?

How Much ?

How Modern ?

What Happened to FCS ?

The LSI

Tech Maturity

The Insurgency (s)

The Soldier

The Message

What Does It Mean ?

- Current Capability vs.
  Near-Term Need vs.
  Future Requirements
- Connection to the Soldier
- Growth Potential
- Simplicity and Consistency of Concept and Message

Enduring Requirements

- Protection (in an IED environment) … aka Protected Mobility
- Soldier and Crew Evacuation
- Mobility (on and off road)
- Deployability (for an Expeditionary Army)
- Lethality (on board and in support)
- Battle Command on the Move @ Echelon

Emerging Requirements

- Robotics "Mother Ship" – Air and Ground
- Network Connectivity and Integration
- Growth Potential: Power, Energy, Weight, etc.
- On-Board Power Management
- Conditions-Based Maintenance
- Human-Centered Design
- Integrated Training

Random Thoughts

- Getting Left of the RFP – Affordably
- Irrevocable Decisions
- Connection to the Soldier
- Full Spectrum – 360 Degrees
- Reset Forward
- Organizational Design
- What is the M113 of the 21st Century ?
- Affordability … Affordability … Affordability