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)
2009 COMBAT VEHICLES CONFERENCE

“SHAPING TOMORROW’S COMBAT VEHICLE PROGRAMS IN TODAY’S VOLATILITY”
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

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 - 10:00 AM  NETWORKING COFFEE BREAK

11:30 AM - 12:30 PM  LUNCH

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

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

4:30 PM  GENERAL SESSION ENDS

10:00 AM  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

4:30 PM  GENERAL SESSION ENDS

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
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 Vehicles Division, NDIA
2009 NDIA Combat Vehicles Conference

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

UNCLASSIFIED: Distribution A. Approved for public release:20268
– 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

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

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

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

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

**Systems Engineering**
- Force Projection Technology
- Vehicle Electronics and Architecture
- Ground System Survivability
- Ground System Power & Mobility

**Technology Driven. Warfighter Focused.**
**Challenges, Facts & Goals**

- **Balance 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**
- 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.
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
Building the Ground Systems Enterprise

Centralized/Shared Ground Systems Integration

User

- Requirements Identification
- Prioritization
- Requirements Analysis

PM/PEO

- Tech Gaps
- O&S Costs
- DMSMS
- Corrective Action
- Prioritization

Log/Sustain

- Logistics
- Sustainability
- Data Analysis
- Life Cycle Costs

Tech

- Technology Maturation
- Tech Research
- Tech Assessment

Not part of Systems Integration Requires Systems Integration

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
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

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
The GSID is Steward of 30 FY10 WFOs (129 Total)
Systems Engineering Excellence

- JUONs
- CPD
- PM Directed
- MOA
- IMS
- Budget
- Models
- Trade-offs
- Integration Concepts
- TRL 6 Components
- Prototype Solution
- Level II Drawings
- Integration Validation
- Approved Concept
- Level III Drawings
- Test Support
- Prototype Solution
- Level II Drawings
- Integration Validation

1.0 Receive & Analyze Capability Request
2.0 Program Definition & Agreement
3.0 Technology & Integration Analysis
4.0 Solution Set Meets Vehicle SWaP constraints?
5.0 Component Development/Maturation
6.0 Prototype Development
7.0 System Meets Customer Expectations?
8.0 Fielding Support

• Customer Decision

Requirements Review
Integration Review
In-Progress Reviews
Initial & Final Design Reviews
Ship to Test Review

Customer Lead
GVIC Lead

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

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
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

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

GVIC Projects (active):
• MRAP Capability Insertion
• C2OTM* – MRAP
• C2OTM* – Stryker
• LAV-R Upgrade
• RS-JPO

*NCommand & Control On The Move

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 Definition/Decomposition & Technology Assessment

Vehicle Integration & Design Studies (SWAP-C)

Performance, Payload & Protection

Survivability Technology Pallet

Integrated Product

Integrated Product

System Integration Lab (SIL)

1st Order OE

Optimization Modeling

Requirements, Integration, mission, threat & technology

RDECs, Industry, Labs, OGAs

Survivability Technology Pallet

1st Order OE

NOTIONAL ARCHITECTURE BLOCK DIAGRAM

- COMMANDERS STATION
- DRIVER STATION
- SIT-AWARENESS
- Rollover Protection
- Threat Suppressors
- Fire Protection
- Data Power System
- Vehicle Load Emulator
- Powertrain
- Thermal (HVAC)
- Hardware
- Software
- Environment
- User
- Integration
- System Architecture
- System Integration Lab (SIL)

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

The "So What" Test

Probability
- Vehicle Integration & Design Studies (SWAP-C)

Burden (Weight, Cost, Volume, TRL, etc)
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)
**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
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.
**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.
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
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)

“Making the Transition to the Future”
Past RAM Projects

ALL PROJECTS COME OUT THROUGH: Federal Business Opportunities


“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

“Making the Transition to the Future”
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

“Making the Transition to the Future”
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**

“Making the Transition to the Future”
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

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◊ Industry Day

“Making the Transition to the Future”
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.
AAV HISTORY

- Improved-Upgunned Weapons Station and Survivability, C4I, Upgrades
- AAV7A1 Reliability, Availability and Maintainability/Rebuild to Standard (RAM/RS) Program
- Re designated AAV7A1 to better reflect mission
- LVT7A1 Service Life Extension Program (SLEP)
- LVT7 Fielded
- Product Improvement Program (PIP)-Upgrade:
  - Lethality
  - Survivability
  - Communications
- C7 Upgrades
- 2007
- 1999
- 2011
- 2013
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.
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

- **Belly and Sponson Armor Solutions**

- **Improved Driver’s Display**

- **Improved Upgunned Weapons Station**

- **Belly and Sponson Armor Solutions**

- **Improved Driver’s Display**
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

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<td>Strategy, Continuous Interaction</td>
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<td>MCO Focus</td>
<td>Spectrum of Conflict</td>
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<td>Linear Progression—</td>
<td>Interaction with Adversaries—</td>
</tr>
<tr>
<td>Leap Ahead</td>
<td>Continuous Innovation</td>
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</tbody>
</table>
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

---

**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**

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)

#### Other Analysis

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

Autonomous Brigade
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
**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

---

**Operational Risk**

![Risk Assessment Graph]
- 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
**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

UNCLASSIFIED
Army Contracting: Procuring Army Strength
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
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.
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
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?
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
<table>
<thead>
<tr>
<th>FY06</th>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
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<tbody>
<tr>
<td>Picatinny Blast Shield</td>
<td>SWORDS</td>
<td>O-GPK Overhead Cover</td>
<td>Objective Weapon Elevation Kit</td>
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<tr>
<td>Hand Emplaced Shape Charge Assembly</td>
<td>Excalibur 1a-1</td>
<td>XM32 Abrams Reactive Armor Tile II</td>
<td>Non-standard Vehicle Armor</td>
</tr>
<tr>
<td>Rapid Entry Vehicle</td>
<td>M1A1/A2 Gunner/Loader Protection</td>
<td>M2 Cal 50 Extender</td>
<td>CROWS/PDCue</td>
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<tr>
<td></td>
<td>Bridge Erection Boat - Force Protection</td>
<td>Objective Gunner Weapon Protection Kit</td>
<td>Sherlock</td>
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<td></td>
<td>Small/Med Machine Gun Weapon Cradle</td>
<td>Purple = SOCOM</td>
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Army's Greatest Inventions

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

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

Multi-Mode Warheads

Joint Modular Intermodal Distribution System

MEMS IMU

MEMS S&A Fuze & Power

Novel/Nano-Structured Energetics

LtWt Small Arms Technologies

See First

Understand First

FUTURE Force

Finish Decisively

Act First

High Power Microwave & LIPC

EM Gun

MOUT

Scaleable Effects
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

**XM324 Non-Line-Of-Sight Cannon (NLOS-C); BAE/ARDEC CRADA**
ARDEC provides primary armament system for FCS NLOS-C Manned Ground Vehicle

**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.

**XM235 Non-Line-Of-Sight Mortar (NLOS-M); BAE/ARDEC CRADA**
Provides Mortar tube and breech for FCS NLOS-M Manned Ground Vehicle

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

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
ARDEC integrates Remote Weapon Stations (RWS) onto a slate 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.
Additional Weapon Technologies

- Laser Ignition
- Compact Auto Loader
- M3WS
- Anti Fratricide Barrier Material
- LIPC
- XM297
- ON-MT
- M777
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

<table>
<thead>
<tr>
<th>Impact Velocity</th>
<th>Monolithic Rods</th>
<th>Novel Penetrators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500 m/s</td>
<td>Adequate data</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>1850 m/s</td>
<td>Adequate data</td>
<td>No data</td>
</tr>
<tr>
<td>2200 m/s</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
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</table>
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!
Name: Joseph A. Lannon

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

After 3 shots

Before

After 1 shot
Obsolescence Mitigation

- Reprogrammable Computer Electronics Unit (CEU)
- Power Distribution Box (PDB)
- Digital Turret Networks Box (TNB)
- Digital Hull Networks Box (HNB)
- Sidecar Embedded Diagnostics (ED) 15 total in tank
**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
TREAT'EM ROUGH!

JOIN THE TANKS
United States Tank Corps.
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?
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

Unclassified

Distribution Statement A: Approved for public release; distribution is unlimited.
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).
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
- **Hedge** against unexpected contingencies
- **Tempo** that is predictable and sustainable for our All-Volunteer Force
TACOM LCMC
ARFORGEN

ACTIVITY

RESET
Recovery From Deployment

TRAIN - READY
Full Spectrum Training / Prepare for Deployment

AVAILABLE
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

13 Oct 2009 Mr. Michael Viggato UNCLASSIFIED
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.”
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

FY03: $1.1B
FY04: $1.5B
FY05: $2.4B
FY06: $1.9B
FY07: $2.1B
FY08: $3.1B
FY09: $2.6B
TACOM LCMC
Bring Your “A” Game

13 Oct 2009
Mr. Michael Viggato

UNCLASSIFIED
Combat Vehicle Conference

BG David Ogg
13 Oct 2009
PEO Ground Combat Systems Organizational Structure

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

APEO Systems Engineering/Chief Systems Engineer
Mr. Anthony Desmond

APEO Corporate Information
Mr. Don Papke

PEO XO
LTC Steven T. Wall

USMC LNO
Maj Stefan Sneden

ATEC LNO
Ms. Gretchen McCoy

APEO Business Management
Mr. Art White

APEO Logistics
Mr. Ken Seibel

APEO Operations Management
Ms. Kristi Sharp

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 LiCol D. Thompson (USMC)
DPM Mr. J. Jaczkowski

Our Mission is Our Warfighters' Future

10/13/2009
Program Executive Office Ground Combat Systems

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"

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 (Army & Marine)
- M777A2
- M119A2
- M198
- M111 IPADS

10/13/2009
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.
PEO GCS Portfolio

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

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

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

Our Mission is Our Warfighters’ Future

10/13/2009

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.
Supporting OCO & ARFORGEN

In The Fight Today
- 410 Abrams
- 700 Bradleys
- 175 Fire Spt Platforms
- 645 Strykers
- 6000 Robots
- 150 JLW Howitzers
PEO GCS Modernization Tenets

Facing Common Upgrade Challenges

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

Opportunity for Common solutions

- Minimizing
- Power Availability

Modernization Synchronized With ARFORGEN

Our Mission is Our Warfighters' Future

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.
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
PM Heavy Brigade Combat Team (HBCT)

Paul R. Lepine
Colonel, Field Artillery
Project Manager
Heavy Brigade Combat Team

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

Our Mission is Our Warfighters' Future

Date: 10/13/2009
PM HBCT FMS Cases
Active and Pending

Morocco
200 M1A1
20 M88 A1
60 M109 A5
36 M577 A2

Greece
48 M577 A2

Iraq
280 M1A1
16 M88 A2
50 M113 A2

Pakistan
115 M109 A5
550 M113 A2

Columbia
880 M1A1
10 M88 A2

Egypt
1005 M1A1
87 M88 A2
400 M2A2 ODS
200 M109 A5
12 M113 A2
26 M577 A2
41 M548 A1

Lebanon
41 M198

Jordan
100 M2A2 ODS
1000 M113 A2

Saudi Arabia
315 M1A2
59 M1A2S
47 M88 A1
48 M109 A5

Bahrain
35 M1A1
100 M113 A2
13 M1064

Kuwait
218 M1A2
14 M88 A2
16 M113 Ambulances
30 M577 A3 CPV

Australia
59 M1A1 SA
7 M88 A2
57 M777 A2

*awaiting conversion
Abrams Projected Improvements

Lethality
- Improved Target Recognition
- Improved Combat Identification
- 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

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

10/13/2009
Bradley Projected Improvements

- 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

- Active Protection Threat Warning System

- Improved Vehicle Health MGT & Embedded Electronic Technical Manuals

- Environmental Conditioning

- Improved Mobility

- Rearward and Side Looking Vision Systems

Develop an Integrated Fighting System that Will Complement Across the Full Spectrum Warfare
Fire Support Platforms Priorities

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

• 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)

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

10/13/2009
Robotic Systems Joint Project Office (RS JPO)

David C. Thompson
LtCol, USMC
Project Manager
Robotic Systems Joint Program Office

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
Robotic Systems Portfolio

**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
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
Bagram Air Field
Kandahar Air Field
Camp Leatherneck
Camp Victory
JRRD-A
JRRD-I
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

- **Endurance Power/Energy**
- **CBRNE Detection**
- **EOD Route Clearance/Engineering**
- **RSTA**

**Equipment**
- 55 lbs Arm Strength
- 90 lbs Dexterity
- 25 lbs

**Operational Environment**

**2004 CAPABILITY**
- Tele-op
- Dedicated OCU
- Improved Communications for: standoff range, crew compatibility

**2010 CAPABILITY**
- Supervised Autonomy
- Interoperability

**Logistics**

**Capability**

**Our Mission**

10/13/2009
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
PM Stryker Brigade Combat Team (SBCT)

Robert W. Schumitz
Colonel, IN
Project Manager
Stryker Family of Vehicles

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

Bottom Line
Stryker provides enhanced, battle-proven capabilities to warfighters
Over 25 million miles in combat
Currently on 11th SBCT deployment

Infantry Carrier Vehicle (ICV) - 130
NBC Reconnaissance Vehicle (NBCRV) - 3
Anti Tank Guided Missile (ATGM) - 10

Mobile Gun System (MGS) - 29
Medical Evacuation Vehicle (MEV) - 16

Engineer Squad Vehicle (ESV) - 13
Fire Support Vehicle (FSV) - 14

Commander's Vehicle (CV) - 28

Stryker provides enhanced, battle-proven capabilities to warfighters. Over 25 million miles in combat. Currently on 11th SBCT deployment.
Deployment History and Future
CY2003 – CY2010

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

Note: The diagram shows deployment dates for various units across different years. The table provides average metrics for each year.
Stryker FoV Modernization History

Jul 09

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

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

Apr 09
SMOD Trade Study Concept

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

May 09
VCSA MGS Brief

Jun 09
MGS CSB/IRP

TDS in Army Staffing 
& TES in OSD Staffing

DoD 5000.02
Updated – TDS impact

Dec 08
MGS CSB

Added three requirements from proponent to the ADM deficiency mitigation efforts

Sep 08
DAE Update

DAE provides S-PIP authority to fund $10M for:
- Mod/Sim
- Spec Development
- Independent BCA
- Requirements Validation

Aug 08
MGS ADM

DAE Tasked - Update TDS/TES and return in 60 days for MS A Credit

Nov 07
PM SBCT CSB

Mar 08
Army Stopped SPIP but continue analysis

Feb 08
MGS DAB

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

May 08
Need ADG

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

Support to fund an additional $67M required for Long-Term MGS deficiency mitigation efforts tied to Stryker Modernization for FoV

Our Mission is Our Warfighters' Future
Stryker Constraints

**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 41,000 lbs

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

Comprehensive System Design results in Balanced Technical Approach

Mobility
Lethality
Transportability
Survivability
Space/Weight/Power
C4ISR
Sustainment

10/13/2009
Combat Vehicle Conference
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.

- Ongoing ECP’s/MWOs address increased survivability.

- Modularity End State is 490.

- 135 – Armored Knights fielded through September 2009.

Lethality
Sustainment
Survivability
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

- **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

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

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

- **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.
### Heavy Brigade Combat Team Formation

**Diagram:**

- **HHC**
- **BTB**
- **HHT**
- **HHB**

**Equipment:**

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

**Notes:**

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

**Total HBCTs:** 31

---

**Our Mission is Our Warfighters’ Future**

10/13/2009
NDIA Combat Vehicles Conference
13 October 2009
LTG Stephen Speakes, Army G-8
To provide an update on the Army’s Fiscal Plan
• 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
  \textit{Getting the Army in Balance}

• FY11 ➔ FYDP
  \textit{Refining the Army of the 21\textsuperscript{st} Century}

\begin{itemize}
  \item Sustain
  \item Prepare
  \item Reset
  \item Transform
\end{itemize}
• 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
• 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*
• 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
• 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
• 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
“SHAPING TOMORROW’S COMBAT VEHICLE PROGRAMS IN TODAY’S VOLATILITY”
 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?
“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.
• 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
ASN (RD&A)

Competency Aligned Organization

MARCORSYSCOM (BGen)

MCSC Competencies
Finance
Contracts
Sys Eng
Logistics

PEO LAND SYSTEMS (SES)

MPC
JLTV
G/ATOR
EFV
LVSR
CAC2S
LW155
MTVR

Additional Support such as Legal, PAO, etc..

MARCORSYSCOM PRODUCT GROUPS AND SEPARATE PM’S
• 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)

Joint Light Tactical Vehicle (JLTV)

Marine Personnel Carrier (MPC)*

Ground Air Task Oriented Radar G/ATOR

Common Aviation Command & Control System (CAC2S)
<table>
<thead>
<tr>
<th>Concept Refinement</th>
<th>Technology Demonstration</th>
<th>Engineering, Manufacturing, Development</th>
<th>Production and Deployment</th>
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</thead>
<tbody>
<tr>
<td>MS-A</td>
<td>MS-B</td>
<td>MS-C</td>
<td>IOC</td>
</tr>
<tr>
<td>Expeditionary Fighting Vehicle (EFV)</td>
<td>Common Aviation Command &amp; Control System (CAC2S)</td>
<td>Ground Air Task Oriented Radar G/ATOR</td>
<td>Logistics Vehicle System Replacement (LVSR)</td>
</tr>
<tr>
<td>Marine Personnel Carrier (MPC)*</td>
<td>Joint Light Tactical Vehicle (JLTV)</td>
<td></td>
<td>Lightweight 155 (M777)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium Tactical Vehicle Replacement (MTVR)</td>
</tr>
</tbody>
</table>
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?
William E. Taylor
PEO Land Systems Marine Corps
Quantico, VA
703-432-3370
Bill.Taylor@usmc.mil
A GREYBEARD’S PERSPECTIVE

William S. Wallace
US Army (Retired)
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