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2011 COMBAT VEHICLES CONFERENCE

"Investment Strategy For The Future of Heavy Forces"

Dearborn, MI

24 – 26 October 2011

Agenda

Tuesday, October 25, 2011

GENERAL SESSION - SESSION I

PEO'S PERSPECTIVE

- Mr. Scott Davis, Program Executive Officer Ground Combat Systems, U.S. Army

ACQUISITION KEYNOTE ADDRESS

- MG John Bartley, USA, Program Executive Officer, Integration, U.S. Army

COMBAT VEHICLES RESEARCH AND DEVELOPMENT

- Dr. David Gorsich, Chief Scientist, U.S. Army RDECOM-TARDEC

GENERAL SESSION - SESSION II

MARINE CORPS KEYNOTE ADDRESS

- BrigGen Daniel O'Donohue, USMC, Director, Combat Development Directorate, U.S. Marine Corps

PANEL DISCUSSION MARINE CORPS PANEL

Panelists

- LtCol (Sel) Ethan Smith, USMC, PM Tank Systems, MARCORSYSCOM
- Maj Zarnecki, USMC, PM Advanced Amphibious Assault, Marine Corps PEO Land Systems
- Maj Henry Kayser, USMC, Operations

PANEL DISCUSSION WAR FIGHTER PANEL

Panelists:

- ·Maj Daniel Hughes, USMC, Instructor, Armor School, U.S. Army's Maneuver Center of Excellence Ft. Benning, GA; Former Tank Company Commander in Afghanistan
- LTC Jay Gallivan, USA, USA Brigade Training Team, NTC
- CPT James Ianitelli, USA, Assistant Product Manager, JERRV/Systems Integration, TACOM
- SGM Brandon Jenks, USA, Sergeant Major for the TRADOC Capability Manager, Stryker Brigade Combat Teams, Fort Benning, GA

Wednesday, October 26, 2011

BREAKOUT SESSIONS WITH PM'S

COL William Sheehy, USA, Project Manager, Heavy Brigade Combat Team
- Mr. Davis Dopp, Project Manager, Stryker Brigade Combat Team

NDIA
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2011 COMBAT VEHICLES CONFERENCE

INVESTMENT STRATEGY FOR THE FUTURE OF HEAVY FORCES

HIGHLIGHTS TO INCLUDE:

- PEO & PM Ground Combat Systems
- Acquisition Keynote Address
- R&D/Future Programs
- War Fighter Panel

OCTOBER 24-26, 2011
WWW.NDIA.ORG/MEETINGS/2620

HYATT REGENCY DEARBORN ▸ DEARBORN, MICHIGAN

EVENT #2620

LODGING INFORMATION

A block of rooms has been reserved at the Hyatt Regency Dearborn. To make your reservation, please use the links below to reserve your room online or call the hotel directly. In order to ensure the discounted NDIA rate, either use the links below or call the hotel; when calling you must ask for the *NDIA Combat Vehicles Room Block*. Rooms will not be held after **October 3, 2011** and may sell out before then. Rates are not guaranteed after this date.

Hyatt Regency Dearborn
600 Town Center Dr.
Dearborn, MI 48126-2793
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Fax: (313) 593-3366

Government Rate: $95*
https://resweb.passkey.com/go/combatgovernment

Industry Rate: $149
https://resweb.passkey.com/go/combatattendees

*Or prevailing Government per diem. The government per diem rate is available only to active duty or civilian government employees. ID will be required upon check-in. Retired military ID's do not qualify.

SPECIAL NEEDS

NDIA supports the Americans with Diabilities Act of 1990. Attendees with special needs or concerns should call (703) 247 - 9463 by October 22, 2010. Please refer to the Combat Vehicles Conference when calling.

ATTIRE

Industry/Civilian: Business Casual
Active Duty Military: Working Uniform (Class B or Service equivalent)

2011 COMBAT VEHICLES CONFERENCE

OVERVIEW

As worldwide terrorism persists and U.S. Armed Forces remain engaged in operations spanning the full spectrum of conflict, military services continue to pursue a balanced effort to sustain a capable current force while preparing for future materiel requirements. With the bulk of our ground forces currently engaged in stability operations, the future role of Combat Vehicles has come under intense scrutiny.

This year's Combat Vehicles Conference is focused to provide insights into defining an investment strategy for the future of heavy forces. The conference will include program updates on selected Army and Marine Corps Combat Vehicles from the respective program experts.

REGISTRATION FEES

All attendees must register and pay the registration fee. Payment must be made at the time of registration. Registration includes admission to the general session, coffee breaks on Tuesday and Wednesday, opening reception on Monday, continental breakfast on Tuesday, lunch on Tuesday, reception on Tuesday, and continental breakfast on Wednesday.

CONFERENCE REGISTRATION FEES	EARLY (BEFORE SEPT. 9)	REGULAR (SEPT. 9 THRU OCT. 13)	LATE (AFTER OCT. 13)
GOVERNMENT/ ACADEMIA/ ALLIED GOV.	$400	$440	$485
INDUSTRY NDIA MEMBER	$615	$680	$750
NON-MEMBER INDUSTRY	$690	$760	$840

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3 Ways to Register!
Online at:
http://www.ndia.org/meetings/2620

By Mail to:
NDIA, Event #2620
2111 Wilson Blvd., Suite 400
Arlington, VA 22201

By Fax to:
(703) 522 - 1885

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All refund, cancellation, and substitution requests must be submitted in writing no later than **October 13, 2011** to NDIA, attn: Alexis Schwartz via email to aschwartz@ndia.org or fax to (703) 522 - 1885. All cancellations recieved before **October 13, 2011** will recieve a full refund minus a $75 cancellation fee. Refunds will not be accepted after October 13, 2011 and will not be given for no shows. Substitutions welcome in lieu of cancellation.

INQUIRES:

Ms. Alexis Schwartz
Director, International Division
(703) 247 - 9463
aschwartz@ndia.org

Ms. Britt Bommelje, CMP
Director, Operations
(703) 247-2587
bbommelje@ndia.org

MONDAY, OCTOBER 24, 2011

3:00 PM - 5:00 PM **REGISTRATION OPEN**

TUESDAY, OCTOBER 25, 2011

7:00 AM - 6:45 PM **REGISTRATION OPEN**

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

8:00 AM - 12:00 PM **GENERAL SESSION - SESSION I**

8:00 AM **ADMINISTRATIVE REMARKS**
▸ LTG John Caldwell, USA (Ret), *Parametric Technologies Corporation; The Spectrum Group; Chairman, Combat Vehicles Division, NDIA*

8:10 AM **GENERAL DONN A. STARRY AWARD PRESENTATION**

8:30 AM **WELCOME REMARKS**
▸ MG Kurt Stein, USA, *Commanding General, TACOM LCMC, U.S. Army*

8:45 AM **PEO'S PERSPECTIVE**
▸ Mr. Scott Davis, *Program Executive Officer Ground Combat Systems, U.S. Army*

9:30 AM **KEYNOTE ADDRESS**
▸ LTG Keith Walker, USA, *Deputy Commanding General, Futures/Director, Army Capabilities Integration Center, United States Army Training and Doctrine Command*

10:15 AM **MORNING NETWORKING BREAK**

10:45 AM **ACQUISITION KEYNOTE ADDRESS**
▸ MG John Bartley, USA, *Program Executive Officer, Integration, U.S. Army*

11:30 AM **COMBAT VEHICLES RESEARCH AND DEVELOPMENT**
▸ Dr. Grace Bochenek, *Director, U.S. Army RDECOM-TARDEC*

12:15 PM **NETWORKING LUNCH**

1:15 PM - 5:30 PM **GENERAL SESSION - SESSION II**

1:15 PM **MARINE CORPS KEYNOTE ADDRESS**
▸ BrigGen Daniel O'Donohue, USMC, *Director, Combat Development Directorate, U.S. Marine Corps*

2:00 PM **PANEL DISCUSSION**
MARINE CORPS PANEL
Moderator:
▸ Mr. Gene Meredith, USMC (Ret), *Director GCS Projects and Global Information Technology Systems Management, General Dynamics Land Systems*
Panelists:
▸ LtCol (Sel) Ethan Smith, USMC, *PM Tank Systems, MARCORSYSCOM*
▸ Col Keith Moore, USMC, *PM Advanced Amphibious Assault, Marine Corps PEO Land Systems*
▸ Maj Henry Kayser, USMC, *Operations Officer, LAV PMO, MARCORSYSCOM*

SCHEDULE AT A GLANCE

MONDAY, OCTOBER 24, 2011
3:00 PM - 5:00 PM
Registration Open

TUESDAY, OCTOBER 25, 2011
7:00 AM - 7:00 PM
Registration Open

7:00 AM - 8:00 AM
Continental Breakfast
Location: Grand Foyer

8:00 AM - 12:15 PM
General Session I
Location: Grand Ballroom

10:15 AM - 10:45 AM
Morning Networking Break
Location: Grand Foyer

12:15 PM - 1:15 PM
Lunch
Location: Regency Ballroom

1:15 PM - 5:30 PM
General Session II
Location: Grand Ballroom

3:30 PM - 4:00 PM
Afternoon Networking Break
Location: Grand Foyer

5:30 PM - 7:00 PM
Annual Conference Reception
Location: Grand Foyer

WEDNESDAY, OCTOBER 26, 2011
7:00 AM - 12:00 PM
Registration Open

7:00 AM - 8:00 AM
Continental Breakfast
Location: Grand Foyer

8:00 AM - 9:45 AM
Breakout Session I
Locations: Springwells Ballroom, Dearborn Ballroom, and Desoto Room

9:45 AM - 10:15 AM
Morning Networking Break
Location: Grand Foyer

10:15 AM - 12:00 PM
Breakout Session II
Locations: Springwells Ballroom, Dearborn Ballroom, and Desoto Room

12:00 PM
Conference Concludes

Combat Team

12:00 PM **CONFERENCE**
ONCLUDES

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. Athony Desmond
U.S. Army TACOM

Mr. Steve Howson
BAE Systems

Mr. Andy Mills
Alcoa Defense

Mr. Douglas Morrison
DuPont Company

Mr. Michael Peck
General Dynamics Land Systems

Mr. Roy Perkins
BAE Systems

Mr. Chuck Prikopa
BAE Systems

Mr. George Sanchez
General Dynamics, Corp.

TUESDAY, OCTOBER 25, 2011 (continued)

3:30 PM — **AFTERNOON NETWORKING BREAK**

4:00 PM — **PANEL DISCUSSION**
WAR FIGHTER PANEL
Moderator: MG Julian Burns, USA (Ret)
Vice President, Business Development & Marketing, BAE Systems
Panelists:
- **Maj Daniel Hughes, USMC,** *Instructor, Armor School, U.S. Army's Maneuver Center of Excellence Ft. Benning, GA; Former Tank Company Commander in Afghanistan*
- **LTC Jay Gallivan, USA,** *USA Brigade Training Team, NTC*
- **CPT James Ianitelli, USA,** *Assistant Product Manager, JERRV/Systems Integration, TACOM*
- **SGM Brandon Jenks, USA,** *Sergeant Major for the TRADOC Capability Manager, Stryker Brigade Combat Teams, Fort Benning, GA*

5:30 PM - 7:00 PM — **ANNUAL CONFERENCE NETWORKING RECEPTION**

WEDNESDAY, OCTOBER 26, 2011

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

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

8:00 AM — **BREAKOUT SESSIONS WITH PM'S (2 ROOMS RUNNING CONCURRENTLY)**
- **COL William Sheehy, USA,** *Project Manager, Heavy Brigade Combat Team*
- **Mr. Davis Dopp,** *Project Manager, Stryker Brigade Combat Team*

9:45 AM — **MORNING NETWORKING BREAK**

10:15 AM — **BREAKOUT SESSIONS WITH PM'S (2 ROOMS RUNNING CONCURRENTLY)**

EVENT #2620 ▸ NDIA REGISTRATION FORM

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION ▸ 2111 WILSON BOULEVARD, SUITE 400 ▸ ARLINGTON, VA 22201-3061
(703) 522-1820 ▸ (703) 522-1885 FAX ▸ WWW.NDIA.ORG

2011 COMBAT VEHICLES CONFERENCE ▸ HYATT REGENCY DEARBORN
DEARBORN, MI ▸ OCTOBER 24-26, 2011

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Subscriptions	▷ Address above	▷ Alternate (Print address below)	

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CONFERENCE REGISTRATION FEES

	Early *before 9-8*	Regular *9-9 thru 10-13*	Late *after 10-13*
Government/Academia[1]	$400	$440	$485
Industry NDIA Member and affiliates (AFEI, NTSA, PSA, WID)	$615	$680	$750
Industry non-NDIA member[2]	$690	$760	$840

Substitutions welcome in lieu of cancellations.

All refund, cancellation, and substitution requests must be submitted in writing no later than October 13, 2011 to NDIA, attn: Alexis Schwartz via email to aschwartz@ndia.org or fax to (703) 522 - 1885. All cancellations recieved before October 13, 2011 will recieve a full refund minus a $75 cancellation fee. Refunds will not be accepted after October 13, 2011 and will not be given for no shows. Substitutions welcome in lieu of cancellation.

[1] *Includes a free three-year NDIA membership and subscription to* National Defense *magazine for military and government employees.*

▷ No, do not sign me up for the free government membership.

[2] *Registration fees for non-NDIA (or affiliate) members include a one-year non-refundable NDIA membership —$15.00 will be applied for your 12 month subscription to* National Defense *magazine.*

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▷ **Check** (Payable to NDIA - Event #2620) ▷ **Government PO/Training Form #** _____

▷ **VISA** ▷ **MasterCard** ▷ **American Express** ▷ **Diners Club** ▷ **Cash**

If paying by credit card, you may return by fax to (703) 522-1885.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ ☐☐/☐☐

Credit Card Number Exp. Date

Signature _____ Date _____

BY COMPLETING THE FOLLOWING, YOU HELP US UNDERSTAND WHO IS ATTENDING OUR EVENTS.

PRIMARY OCCUPATIONAL CLASSIFICATION. Check ONE.

- ▷ Defense Business/Industry
- ▷ R&D/Laboratories
- ▷ Army
- ▷ Navy
- ▷ Air Force
- ▷ Marine Corps
- ▷ Coast Guard
- ▷ DOD/MOD Civilian
- ▷ Government Civilian (Non-DOD/MOD)
- ▷ Trade/Professional Assn.
- ▷ Educator/Academia
- ▷ Professional Services
- ▷ Non-Defense Business
- ▷ Other _____

CURRENT JOB/TITLE/POSITION. Check ONE.

- ▷ Senior Executive
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- ▷ Professor/Instructor/Librarian
- ▷ Ambassador/Attaché
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- ▷ Colonel/Navy Captain
- ▷ Lieutenant Colonel/Commander/ Major/Lieutenant Commander
- ▷ Captain/Lieutenant/Ensign
- ▷ Enlisted Military
- ▷ Other _____

Year of birth _____
(optional)

QUESTIONS, CONTACT:

ALEXIS SCHWARTZ,
DIRECTOR, INTERNATIONAL DIVISION

PHONE: (703) 247-9463

E-MAIL: ASCHWARTZ@NDIA.ORG

MAIL REGISTRATION TO:

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Combat Vehicle Modernization

Changing Business Practices to Deliver Cutting-edge Capabilities

2011 Combat Vehicle Conference

MG John Bartley

25 October 2011

Integrate & Synchronize: BIG "A" Acquisition
Delivering Capabilities

- Fielding Networked Systems that are COE Compliant
- Aligning CPRs with CSBs
- Challenging Requirements
- Adequate and streamlined testing
- Establishing Affordability Targets as KPPs [(T)&(O)]
- Willingness to Trade Performance to Hold Cost & Schedule
- Executing Incremental Development Strategies

One Changing Paradigm

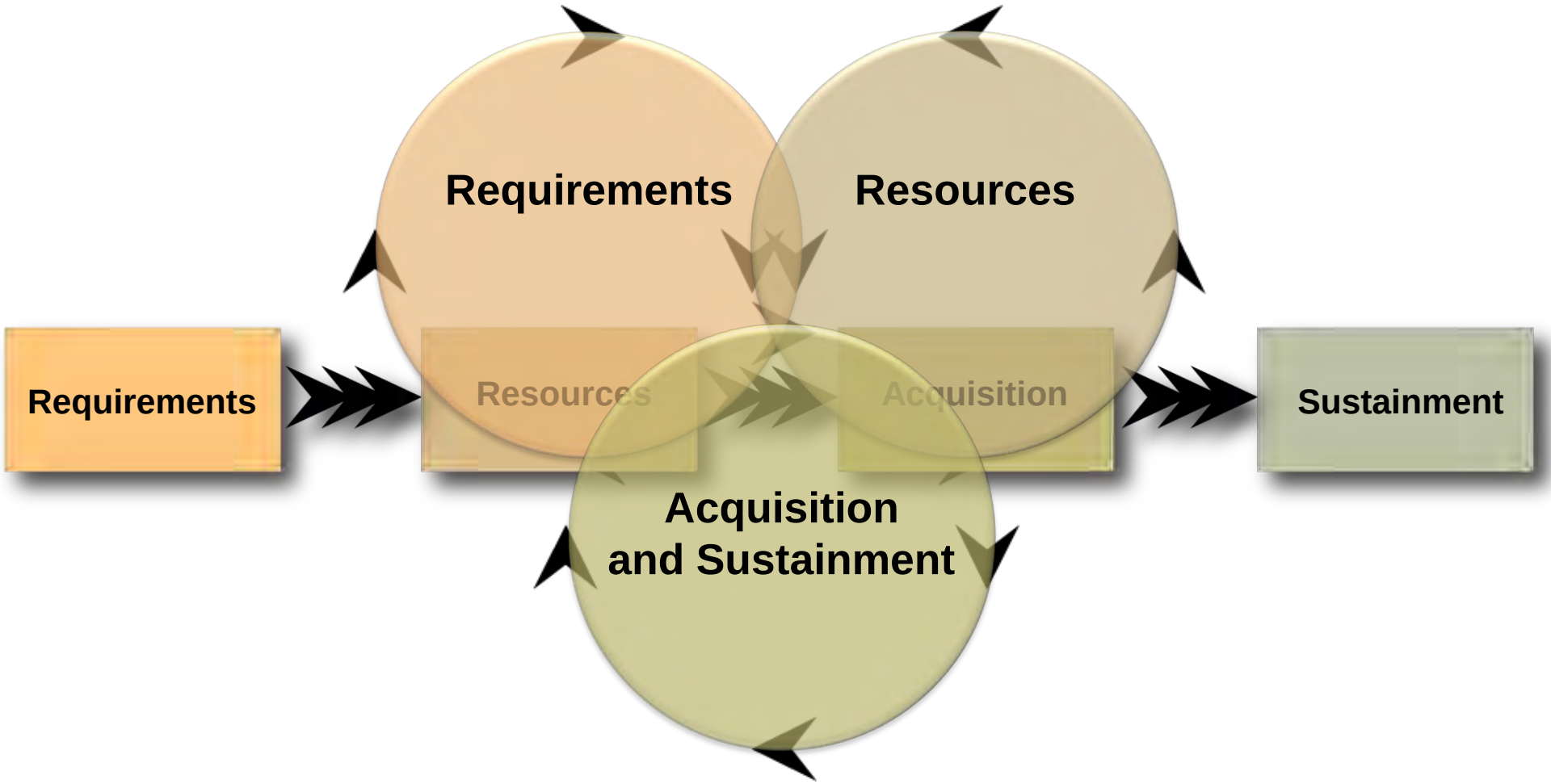
Capability at Any Cost!

to

What Capability at What Cost & Schedule?

Collaboration Absolutely Necessary – Industry Feedback Essential!!!

Delivering Capabilities: BIG "A" Acquisition



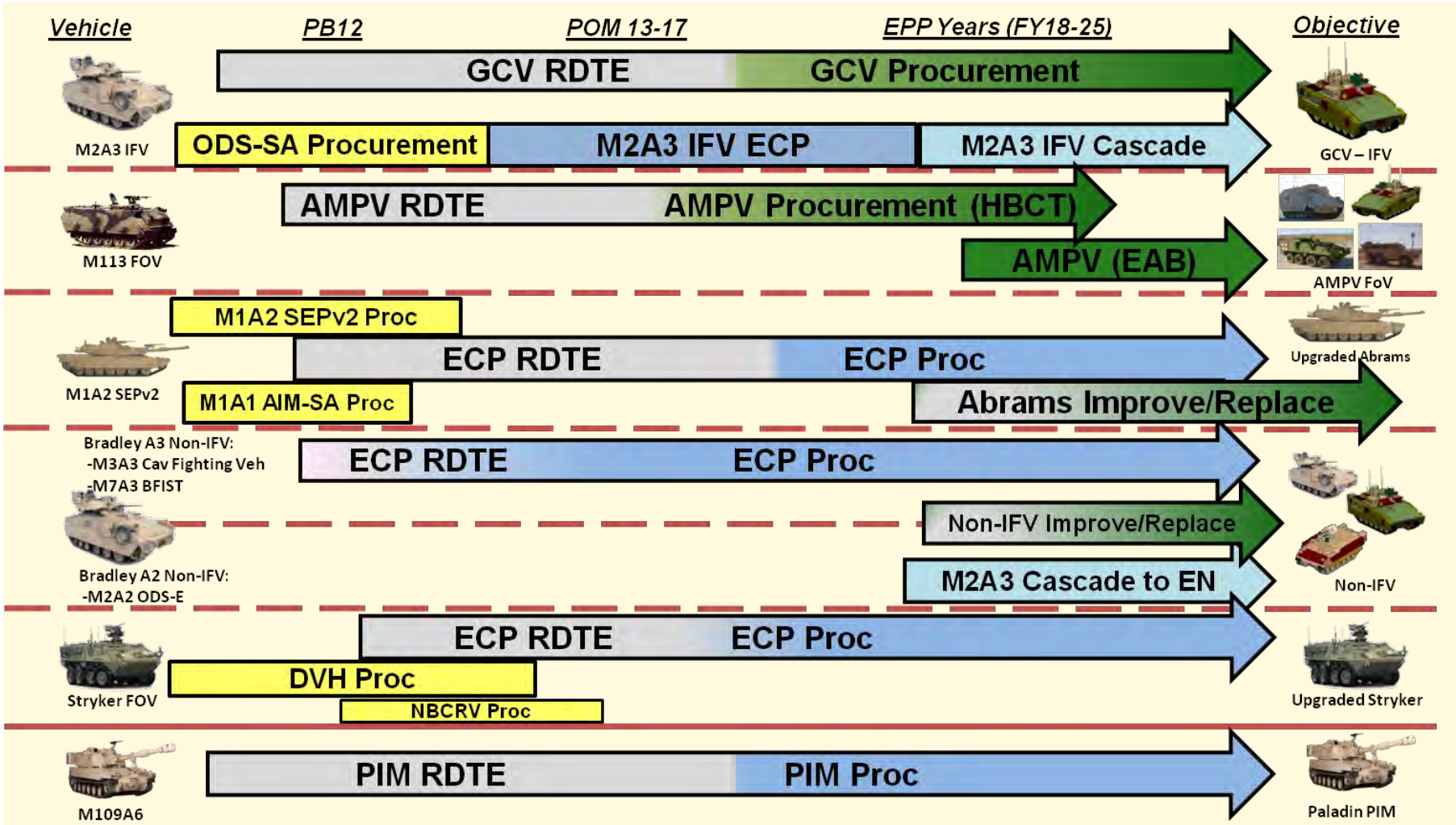
PMs must operate across the full spectrum of Acquisition

The Army's Combat Vehicle Modernization Strategy

Transform, Replace and Improve*

- **Transform** --- ***acquire the Ground Combat Vehicle to provide our Soldiers the capabilities they need to fight and win today and in the future;****
- **Replace** ***our M113 Family of Vehicles with a platform able to meet the demands of today's Contemporary Operational Environment;***
- *** and Improve** ***our Abrams, non IFV Bradleys, Paladin and Stryker Vehicles so they remain relevant and capable.***

Combat Vehicle Modernization Strategy Roadmap



Combat Vehicle Modernization

- Modernizing the fleet to improve capability gaps in **Protection**, **Network**, **Mobility** and **Lethality**
- **…**while ***regaining Space, Weight, Power and Cooling (SWaP-C)*** margin required to integrate planned and future upgrades
- Modernizing to include modular and open architecture with growth potential to support integration of future capabilities
- Development and fielding of the GCV IFV, Paladin PIM and determining the replacement strategy for the Armored Personnel Carrier (M113) Family of Vehicles (FoV) remain the Army's priority efforts within this portfolio
- Fiscal realities and balancing across CVM portfolio support combination of developmental and ECP approaches

GCV IFV MS A ADM Summary

- **Three-pronged approach driving toward an affordable set of requirements to support a well-informed MS B**
  - AoA Dynamic Update
  - Assessment of selected Non-Developmental Vehicles
  - Technology Development Strategy contractor efforts
- **Reinforced Army Cost and Schedule Targets**
  - $13M AUPC
  - $200/mile O&S
  - Seven years to first production vehicle
- **Full and Open Competition for the EMD phase**

Key Aspects of GCV Strategy Remain Unchanged

- Driving to a “Fully Informed” MS B
- Incremental approach to attain capability with growth for future capabilities
- TD phase drives to affordable, achievable set of capability / requirements

Challenges – Modernizing in Lean Times

- Today's reality: continued fiscal uncertainty and impacts to modernation requires an improved acquisition model
- Maintaining appropriate industrial base as operations wind down
- Working more closely with you to maximize capabilities

Army Modernization – Myths and Truths

ACQUISITION TRANSFORMATION

- The budget environment we now face calls for a greater emphasis on affordability as part of a new balance between national security and fiscal discipline. Acquisition reform and the pursuit of efficiencies go hand-in-hand.
- The acquisition process is truly a team sport incorporating inputs from across DoD. (Requirements, resourcing, program execution, testing). Reform is really about harmonizing these inputs throughout the acquisition cycle.

Myth: **Army has lived "high on the hog" over the last decade, now it's the other services' turn.**

Truth: Army began with a $56B shortfall in equipment (2001 Holes in the Yard).
Army priority over the last decade has been the war fight.
We have incrementally improved our existing equipment.

Myth: **The Army can't acquire anything, why invest in them?**

Truth: Army modernization successes:

• MRAP and MRAP-ATV	• Helicopter Improvements
• 9 Body Armor Improvements	• Protected medium and heavy truck fleets (Up-Armored)
• Precision Munitions	• Stryker Double-V Hull
• C-IED (CREW Devices)	• 3 New Sniper Rifles
• New Camouflage Uniforms	• M4 Improvements
• Warfighter Information Network-Tactical (WIN-T)	• UAVs (Grey Eagle, Shadow, Raven)
• Joint Battlefield Capability-Platform (JBC-P)	• Light-weight Crew-served Weapons
• Joint Capability Release (JCR)	• Combat Vehicle Improvements

PEO GCS
Portfolio Overview

Combat Vehicle Conference

Mr. Scott Davis

PEO GCS

25 OCT 2011

Agenda

- Portfolio Overview
- Capability Portfolio Analysis Tool (CPAT)
- Commonality Potential
- Achieving Efficiencies Together
- Challenges & Opportunities

Program Executive Office Ground Combat Systems

2,338 Abrams Tanks*

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

**4,559 Bradley*
465 Knight**

4,000 Robotic Platforms

(**Army & Marine Corps**)
- XM1216 SUGV
- M160
- MARCbot
- PackBot Family
- TALON Family
- Mini – EOB (SUGV-310)

PEO GCS PORTFOLIO

969 Self-Propelled Howitzer Systems*

3,894 Stryker Platforms

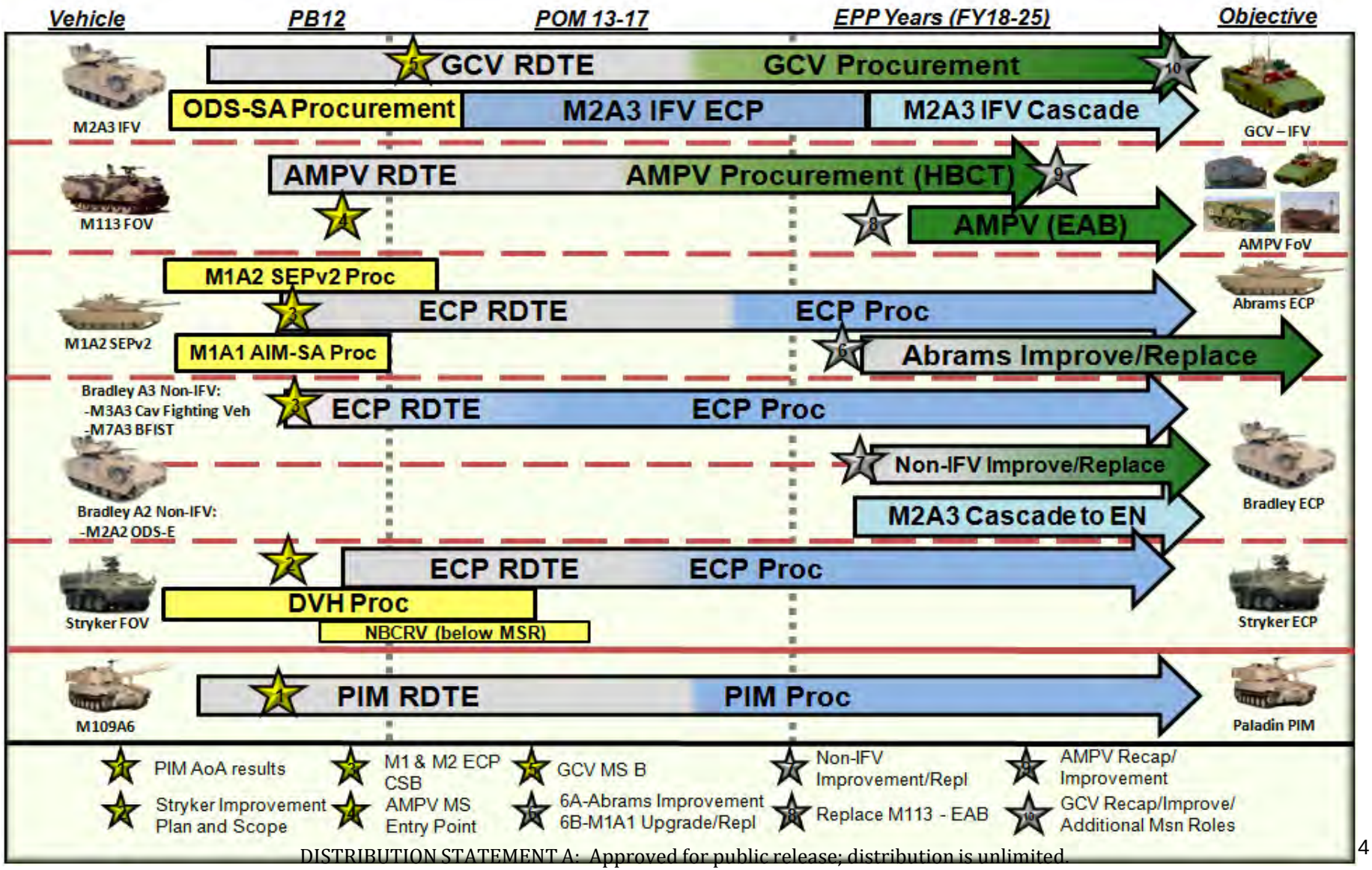
- Stryker Family of 10 vehicles

Ground Combat Vehicle

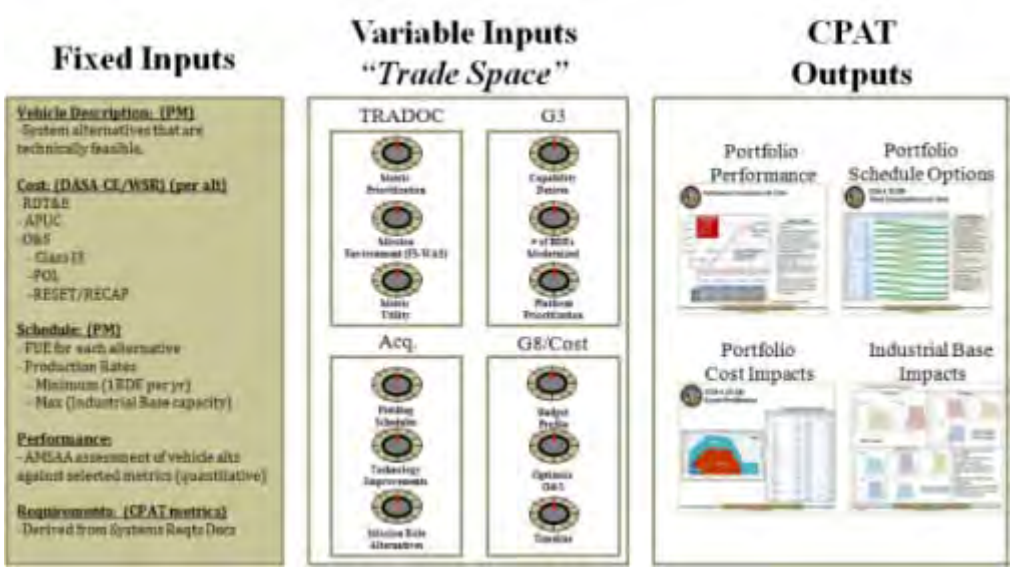
3,901 M113 FoV*
1,056 M88 Recovery Vehicles*

* Does not include systems in long term storage

Combat Vehicle Modernization Strategy



Capability Portfolio Analysis Tool (CPAT)

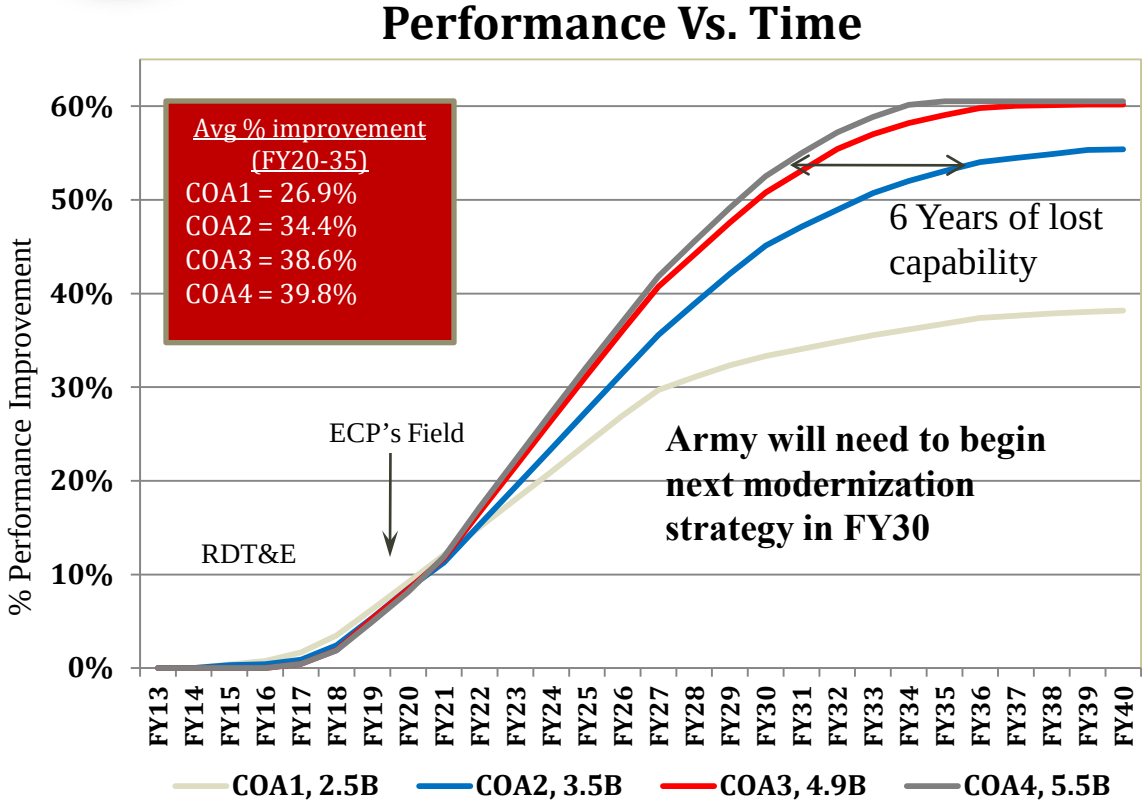


- **Purpose:** Establish an analytical approach to identify the optimum courses of action (Cost, Schedule, and Performance) for PEO GCS portfolio investment

- **Excursion Analysis Objectives:**
  - Conduct analysis of current program alternatives
    - o Updated performance and cost data
  - Outline the impacts of Budget changes to the Combat Vehicle Modernization Strategy
    - o Vary Budget based on HQDA G8 guidance
  - Provide the analytical underpinnings that support an achievable and affordable Combat Vehicle Modernization Strategy
    - o Define the holistic implications of various courses of action based on different budget profiles

***I believe it is a great tool to show leadership multiple COAs and the impacts/costs of various approaches. . . .This could be a game changer across multiple portfolios." GEN* Chiarelli 30 AUG 11**

CPAT Performance Comparison (Example)



	COA1, 2.5B	COA2, 3.5B	COA3, 4.9B	COA4, 5.5B
Acquisition	$ 52,071,766,991	$ 65,519,571,991	$ 80,291,026,991	$ 81,447,842,991
O&S	$ 69,232,189,786	$ 79,982,847,786	$ 74,284,175,786	$ 73,290,884,786
RDT&E	$ 3,496,500,000	$ 8,778,900,000	$ 9,291,900,000	$ 9,291,900,000
Total	$ 124,800,456,777	$ 154,281,319,777	$ 163,867,102,777	$ 164,030,627,777

Summary of Findings

- Maximum achievable performance is ~60% in 2040.
- Reduction of the budget to $2.5B will result in losing Abrams Modernization and ~22% of Force Effectiveness.
- Reducing budget profiles extend the production plans and will force the Army to a minimum sustaining rate rather than a optimal production rate.
- Lower budget profiles drive O&S cost higher because they are maintaining older systems longer.
- Creating a common platform (GCV chassis) that provides significant growth and protection drove the model in its COAs
- Key capability characteristics (Net, FP, and Growth) are achievable through modernization in spite of constricting budgets when able to conduct trades across the portfolio.

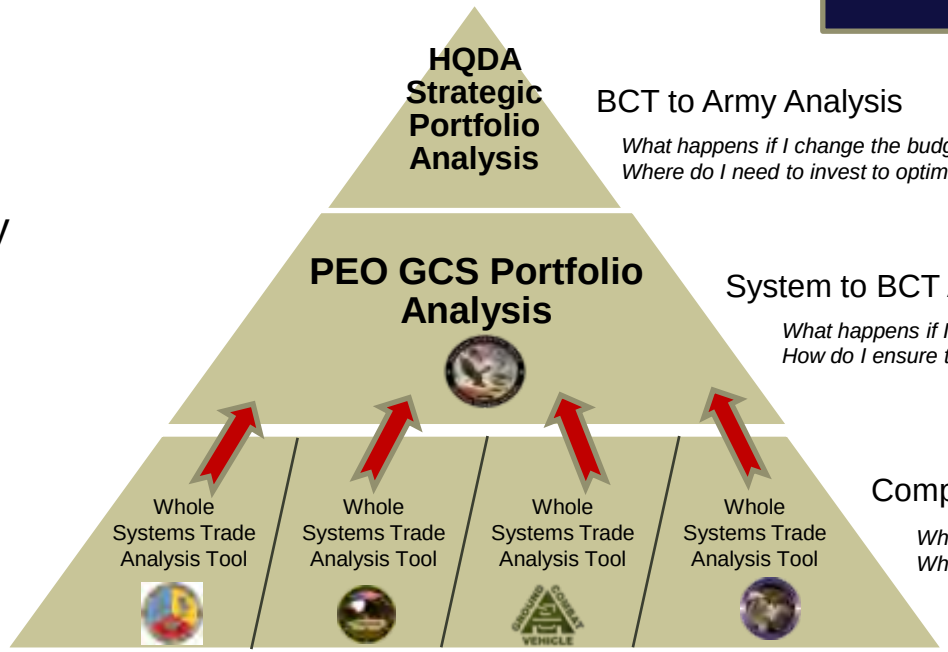
Portfolio Analysis

Motivation -
SECDEF Priority

"Chief among institutional challenges facing the Department is acquisition…I feel that many programs that cost more than anticipated are built on an inadequate initial foundation."

Secretary of Defense Robert M. Gates
January 27, 2009

- Common Architecture
- Scalable
- Defendable decision analysis methodology
- Quantifiable budget implications
- Balancing Cost, Schedule and Performance at each echelon



BCT to Army Analysis

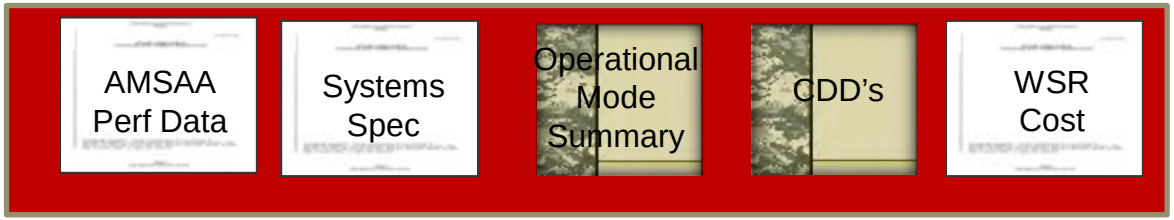
What happens if I change the budget allocation?
Where do I need to invest to optimize for an affordable Army?

System to BCT Analysis

What happens if I change the budget allocation to PEO GCS?
How do I ensure the BCT is compatible and affordable?

Component to System Analysis

What happens if I change this reqt?
What am I trading if the budget is reduced?

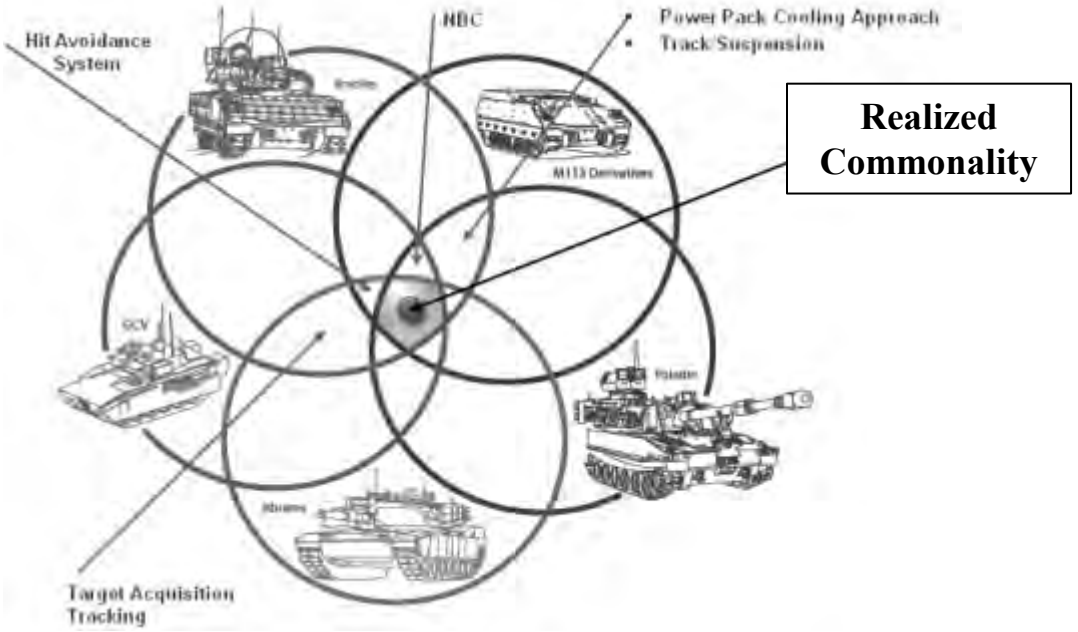


Common Data Picture

Commonality Potential

Current Context

- Almost identical functional architectures across major ground combat systems (e.g. Victory & COE)
- Industry/OEMs moving away from vertical integration towards selection of suppliers based on best value
- COTS provides opportunities for commonality, cost savings, and tech refresh
- Declining budgets



Future Benefits of Commonality

- Reduce lifecycle cost and improve efficiency through:
  - Economies of scale
  - Increased competition
  - Streamlined logistics supply chain
  - Improved ease of integration for upgrades
  - Obsolescence mitigation
- Make materiel solutions more affordable and adaptable
- Operational impact for the Warfighter

Achieving Commonality

- Acquisition Approach
  - Explicit Commonality directives in Acquisition contracts
    - Government pays for Commonality analysis as part of performance spec
    - Government reserves right to direct common standard or component
- System Engineering
  - On going PEO led system engineering focused on coordinating standards across fleet
  - Approved standards will be directed if appropriate
  - PEO led Configuration Control Board will function as oversight on system trades, and major materiel solutions for obsolescence and new programs
- Business Case Development
  - Government internal analysis on a case by case basis

Achieving Efficiencies Together

- Current economic and budget environment demands new ways to drive down costs in programs
- Affordability is now (and will remain) the major driver in program decisions
- Dr Carter's Better Buying Power initiatives fully implemented over past year and remain guide post to drive affordability and control cost growth
- We need your help to determine new ideas, as well as leverage existing programs (i.e. Value Engineering Change Proposals) to reduce cost and improve quality
- Our focus is to drive down cost, not profit...we will incentivize to find “best value” and look for Industry’s help to get the most for every taxpayer dollar

Challenges & Opportunities

- Modernizing the ground combat vehicle portfolio in an environment of fiscal austerity
  - Must be mindful of cost and providing best value…RFPs must incentivize behavior
- Common Architecture, standards and interfaces
  - Open/Non Proprietary – minimizes “not invented here” syndrome
  - Weighted in multiple RFPs to facilitate efficiencies at 2nd & 3rd Tier Vendor level
  - Encourages lower tier investment due to common application across a larger base
  - Potentially increases vendor base and interest from nontraditional suppliers
  - Facilitates innovation and investment (iPhone model)
- Formation/Fleet Trades
  - Synchronizing requirements across a formation to drive common solutions (i.e. optics & sights having same range/detection/recognition)
  - Facilitates quantity buys if extended to preferred parts or common specifications . . .
  - Opportunity is now – this window will not happen again

We need your insights & support to turn this into reality

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Achieving Commonality

- Achieved through:
  - Cross-platform systems engineering and defining opportunities for common functional and physical requirements and architectures
  - Development and base lining of functional and physical architecture requirements for PEO-wide use (when financially advantageous to do so)
  - Executing proof-of-principle demonstrations of common architecture requirements on multiple PEO platforms
  - Common materiel solution/ component options developed through application of sound technical and business cases analyses and validated using proof-of-principle demonstrations
- Infrastructure to support commonality includes:
  - New collaboration mechanisms (Common Operating Environment, VICTORY)
  - Ensure cross collaboration with other PEO and industry partners through the use of IPTs and working groups
- Implemented when specifications for common materiel solutions can be competed and integrated across ground domain systems

PEO GCS Modernization Schedule (Pre Decisional)

	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
GCV IFV	MS A		MS B				MS C			GCV IFV FUE	
Abrams		ECP Contract Award	PDR	CDR		Production Contract Award			Abrams ECP FUE		
Bradley		EMD Contract Award	PDR	CDR		Production Contract Award		Bradley ECP FUE			
AMPV		MDD		MS B			MS C	AMPV FUE			
Stryker		NBCRV FRP									
PIM	IPR DAB		MS C				PIM FUE				
SUGV			MS C/ FRP								

PEO GCS Mission

Execute lifecycle management of the world's best ground combat systems in a collaborative learning environment by developing, acquiring and supporting modernized and affordable systems with common integrated capabilities, always focused on the needs of the Joint Warfighter

PEO GCS Vision

A highly collaborative organization of Acquisition professionals that leverages the unique expertise of critical partners to deliver the most adaptable, affordable and integrated unit capabilities to the Joint Warfighter

PM Stryker Brigade Combat Team (SBCT)

Mr. David Dopp
Project Manager

U.S. Army, TACOM
Phone: (586) 282-2001
Email: david.j.dopp2.civ@mail.mil

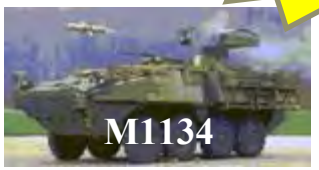
Stryker Family of Vehicles

Total in a Brigade: 332

Current Fleet Delivered: 3,894

Remaining On Order: 292

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 28 million miles in Combat
Currently on 15th 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

Supporting the ARFORGEN Process

Current Operations

BDE CONUS/OCONUS
Fort Bliss, TX
Fort Hood, TX
FtIG, PA
Fort Wainwright, AK
Fort Lewis, WA (3ea BDE
Schofield Barracks,
Vilseck, DE

COMMAND
Warren, MI
Washington D.C.

DEPLOYED BDE
OEF

PRODUCTION
Anniston Army Depot, AL
Lima, OH
London, Ontario, CA

SPOD/APOD OPS
San Diego, CA, US
Tacoma, WA, US
Honolulu, HI, US
Charleston, SC, US
Beaumont, TX, US
Bremerhaven, DE
Diego Garcia, GB
MM2

BATTLE DAMAGE REPAIR
Anniston Army Depot, AL
Qatar

RESET FACILITIES
Anniston Army Depot, AL
Fort Lewis, WA
Qatar

Priorities

Production:

- 292 DVH (Sep/Oct Award)
- NBCRV FRP in Dec (168 additional)

Fielding:

- DVH (ongoing)
- 8th BDE (FY12)
- 9th BDE (FY13)

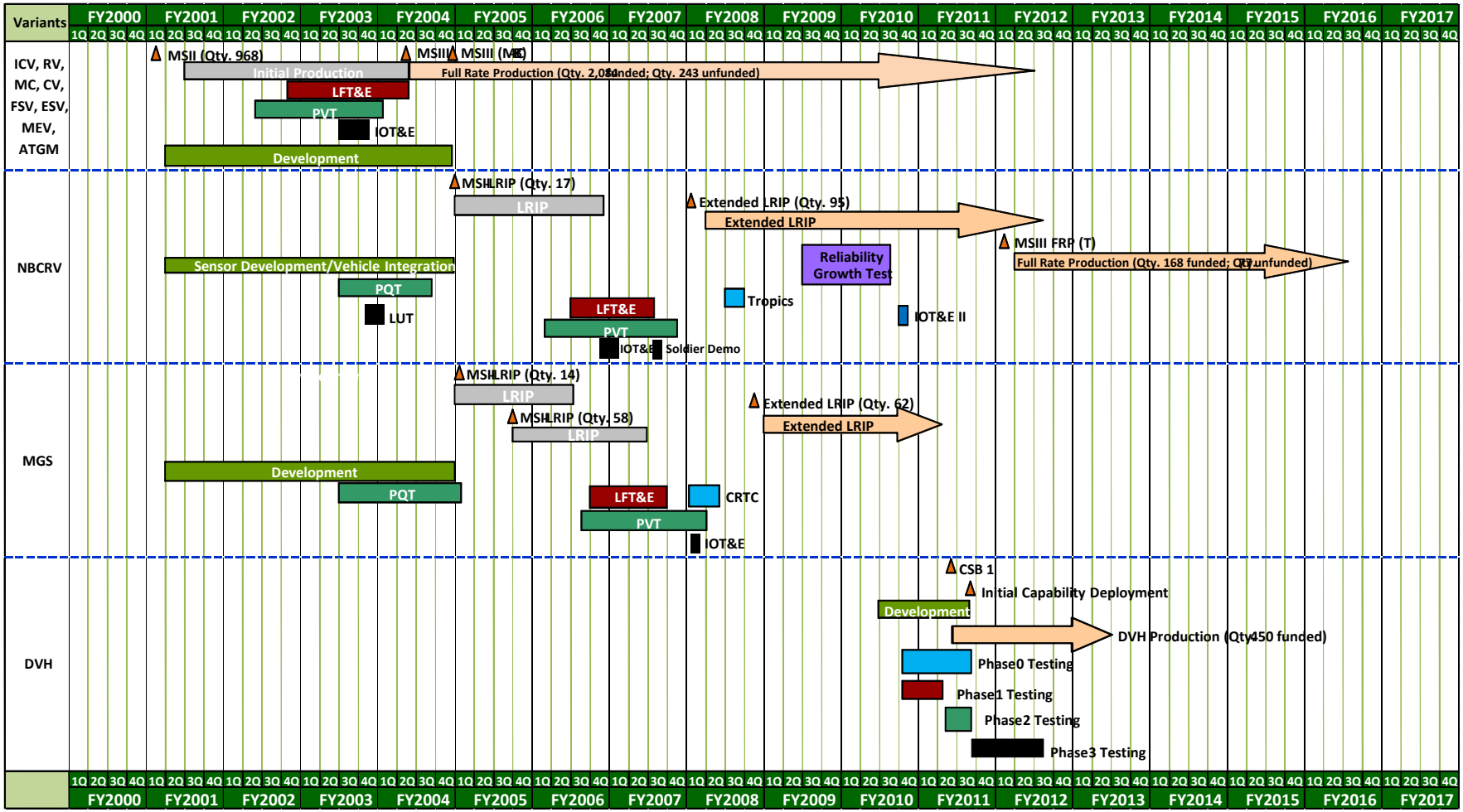
Sustainment:

- Blue to Green
- Reset (OEF vehicles @ ANAD, FY12)
- BDAR (ongoing @ ANAD / Qatar)

Upgrade:

- ECP (Network) in process
- Recap (planning in process)

Stryker Program Schedule



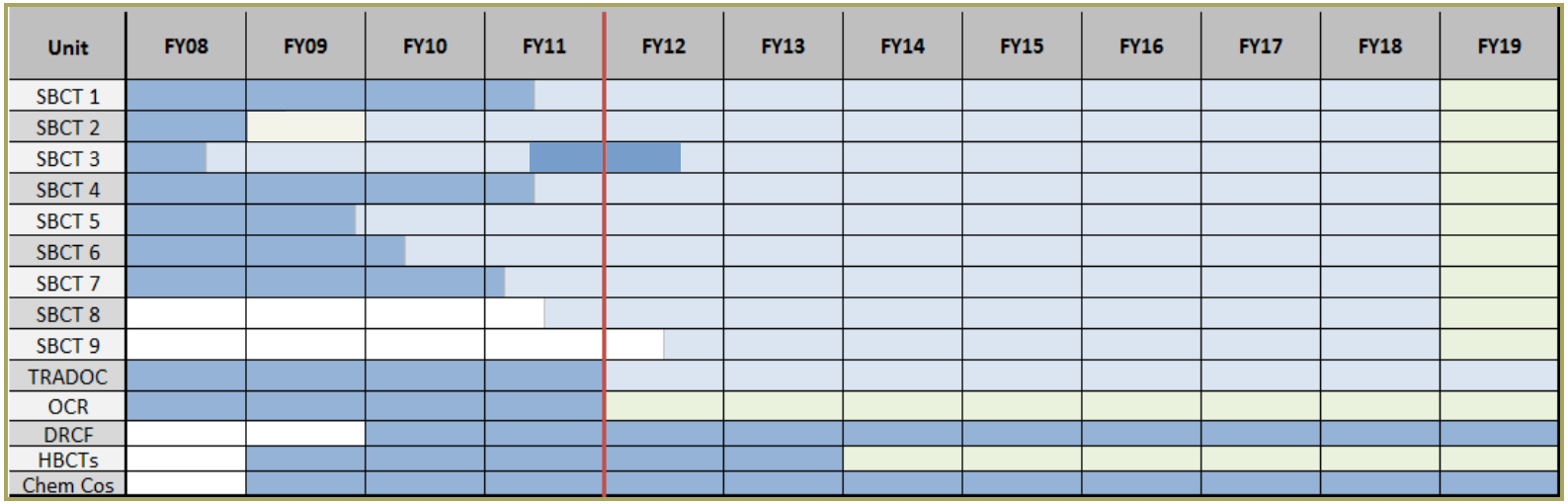
Stryker Transition to Organic Maintenance Support

Supply Support

- Garrison units transition in the beginning of FY12
- Parts flow through AWCF after transition

Maintenance Support

- Brigades began transitioning in FY08
- Production-8 variants will complete transition to organic unscheduled support in FY12
- MGS and NBCRV will retain unscheduled service support
- In SBCTs/HBCTs:
  - MGS TBD
  - NBCRV until 94F are trained, target FY13
- In Chemical Companies:
  - Until an MTOE change adds 94F to chemical companies
- Units retain 4 FSR / BDE post transition, retaining CLS mechanics for scheduled services



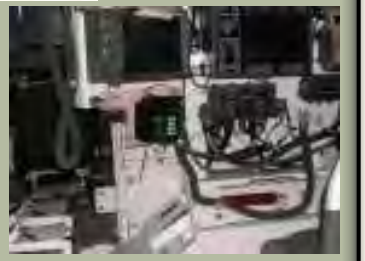
CLS for ALL Variants	MGS and/or NBCRV CLS	Organic/Ktr Hybrid

Stryker Opportunities for Industry and Challenges

- Industry Potential:
  - GDLS Supplier/Sub-Contractor
  - Weight Reduction/Saving Alternatives
  - Production of A-kits (mounting/attachment hardware) for DVH kits
  - Survivability kit refurbishment (e.g., platt swing mounts)
  - Packaging for selected assemblies (e.g., suspension items)
  - Facilities maintenance/other logistics support for Stryker facilities in US and Qatar
  - Recurring Stryker Unique Sustainment Item Procurements (e.g. kits, brackets, metal plating, and cables)
- Communications and Net Readiness:
- C2 Technologies, Smart Display Commonality, Modular Intra –Vehicle Network
  - Situational Awareness: Out of Hatch capabilities, Video recording, 360 SA
- Integrate C4ISR Systems into Stryker Platforms- Technology Capability Integration Solutions
  - Compliance with Net-centric Operations and Warfare Standards
  - IDE (Integrated Digital Environment) -
    - The IDE is an integral part of Stryker becoming part of the Army Net-Centric Data enterprise. IDE will be implemented using ANCDS technologies and architectures.
  - Robust Network Capability (voice – data – video) enabling communications for line of sight or beyond line of sight
  - Execute Tactical Network Operations to expand and extend transport network based on operational needs
- Supportability:
  - Continuous/cost-saving Improvement to support the FOV

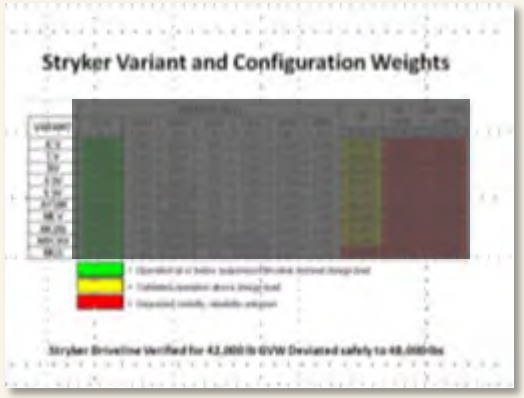
The Need to Upgrade

SPACE



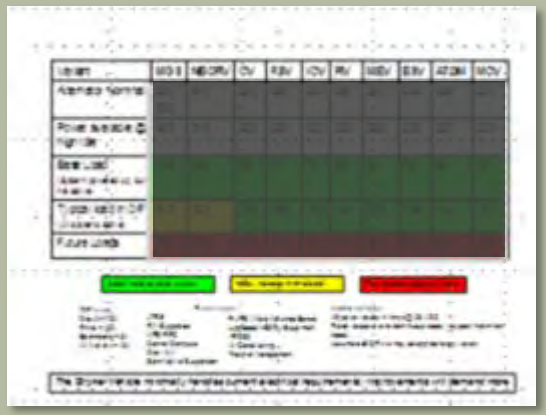
- Multiple Appliqué solutions added; "Scaleable / Kitable Concept" limited
- Kits create both interior & exterior challenges for each carrier variant
  - CREW, GSS/MSS, Armor Upgrades
  - Additional displays/screens
  - 2nd/3rd order effects include weight and power

WEIGHT



- Kits required to address threats
  - IED, RPG, EFP, Sniper, etc
- Only select Kits can be applied
- Deployed configuration weighs more than planned
- Limit Mobility

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 Soldier's effectiveness

Current Space, Weight, and Power Capacity Shortfalls require Upgrades to Stryker FoV

Stryker FoV C4ISR Integration Timeline

Upgrades…
•Digitization ?

2017+
2016
2015
2014
2013
2012
2011

Long Term
Near Term

V1.0 V1.1 V1.2 V1.3 V1.4 V2.0 V2.4

MC3P Fielding

C4ISR ONS REQTs

VICTORY Timeline
V1.0 – V2.4


117G


OSRVT

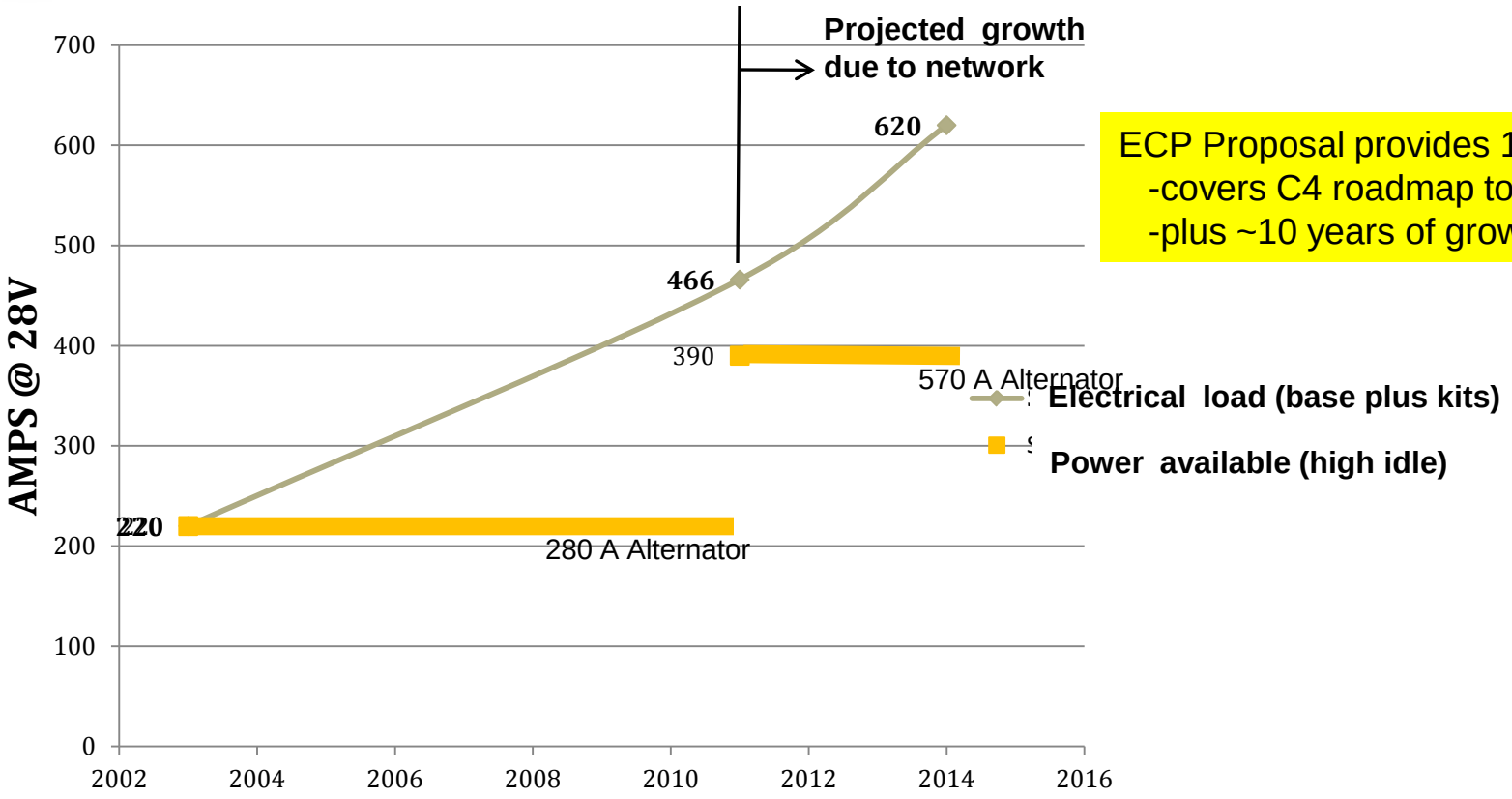

BFT


LW/ MW

JTRS
Intra-Vehicle Network
WIN-T INC 3
Duke TI
WIN-T INC 2
Nett Warrior
CS 13-14
SA OoH
OSRVT (Rover 6)
360 SA
CREW V2 Relocation/V3
JBC-P
MSS
JPT
CS 11-12 OoC (JCR)
BFT II
Boomerang
VRC 103 & 104

Funded
Partial Funding
Unfunded

Stryker Power Demand Growth over 10 years (CV)



ECP Proposal provides 1,000 amps
-covers C4 roadmap to 2017
-plus ~10 years of growth

- Power demand has grown ~30 amps per year since program inception.
- Current C4 roadmap projections are on track to increase that historical rate.
- Stryker CV already cannot power all installed systems at the same time.

Potential Stryker ECP Technologies

GAP: Mobility
- **Suspension**
  - 60K w/semi-active suspension
  - Improved Mobility

GAP: Mobility/Protection
- **Power Train Upgrade**
  - 450HP engine
  - Heating/Cooling System
  - Parking Brake

GAP: Network Enabled/Protection
- **Electrical System**
  - Increase electrical power
  - Battery and Power management

GAP: Protection
- Increased IED/Mine protection (e.g. DVH)
- Energy Attenuating seats

GAP: Lethality/Protection
- RWS Upgrades
  - Javelin
  - Far target/slew to cue
- 360 SA
- Gunshot detection

GAP: Network Enabled
- Integrated C4 upgrade
- Centralized processing with data and video networks
- MILS network
- GSS/MSS integration
- Multi-functional Displays
- Enhanced embedded training

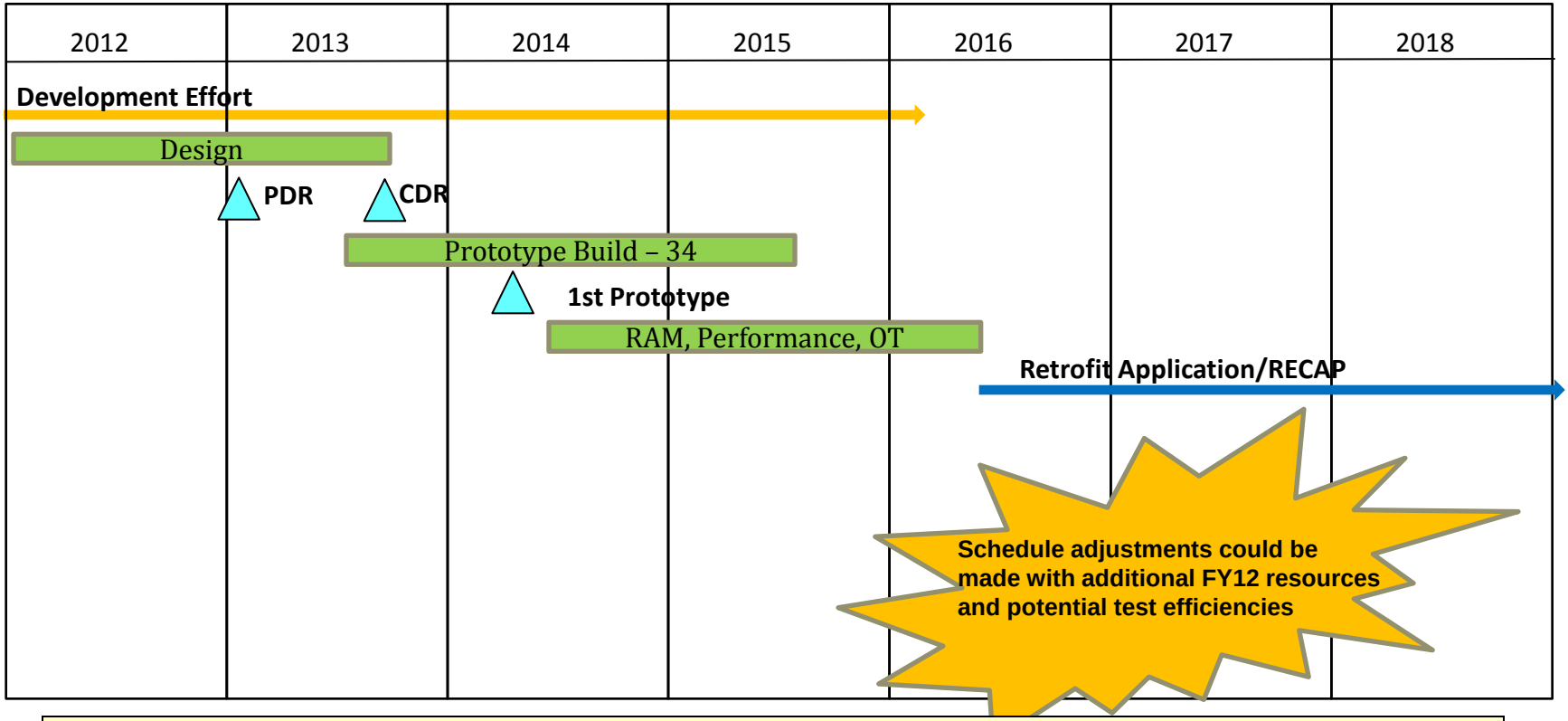
GAP: Lethality/Protection

MGS Long Term Deficiencies
- Color day sight/display
- Reduced trigger delay/gun tube stabilization
- Under armor 50 cal
- Improved 105MM ammo protection

Potential ECP Technologies

Not being pursued under ECPs

A Notional ECP COA



• Notional schedule above implies a January 2012 start date--decision on size/scope of ECP unlikely before spring of 2012

OUR MISSION IS OUR WARFIGHTERS' FUTURE

Combat Vehicle Conference
24-26 October 2011

Dr. David Gorsich
Chief Scientist

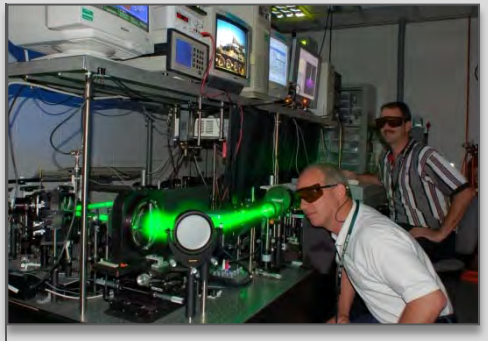
U.S Army tank Automotive Research, Development and Engineering Center (TARDEC

TARDEC Mission

The Arsenal of Democracy

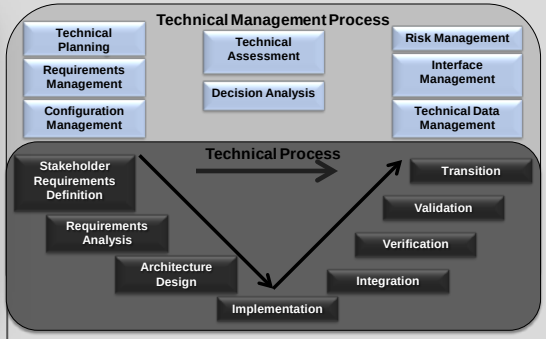
- Connected to World-Class Automotive Engineering Universities at our Doorstep
- Defense Industry Ground Systems Hub
- Direct Linkage to World-Class Automotive Research and Development Centers
- Strategic Engagement with 1st, 2nd & 3rd Tier Automotive Supplier Network

Capabilities



Research

Technology Development



Systems Engineering

Integration

Production Support

Field Support

Technical Focus

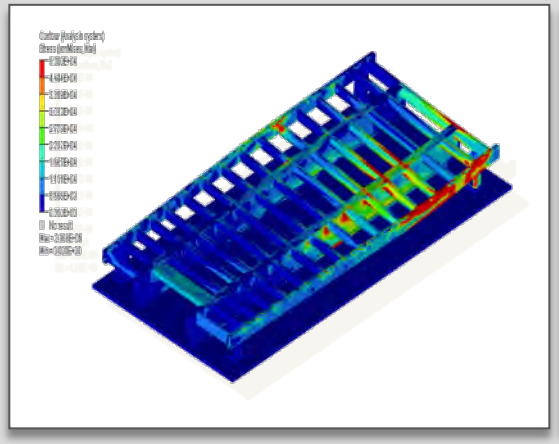
Key Technical Thrust Areas

- Ground System Survivability
- Vehicle Electronic Architectures
- Ground Vehicle Robotics and Intelligent Systems
- Ground Systems Power, Energy and Mobility
- Force Projection Technology; Alternative Fuels, Lubricants and Water Purification

Facilities

Laboratory Capabilities

- Ground Systems Power and Energy Laboratory (GSPEL)
- Advanced Concepts Laboratory
- Advanced Collaborative Environments (ACE)
- Laser Protection Laboratory
- Armor Nondestructive Testing Laboratory
- Robotics Systems Integration Laboratory
- Ground Vehicle Systems Integration Laboratory
- GVR Robotic Laboratories
- Electronics Integration
- Physical Prototyping
- Design & Digital Mock-up
- Metallurgy Test Laboratory
- Survivable Structures Laboratory
- Ground Vehicle Power & Mobility Elastomer Improvement Laboratory
- Ground Vehicle Power & Mobility Propulsion Laboratory
- Physical Simulation Laboratory
- Analytical Simulation Laboratory
- TARDEC Simulation Labs
- Survivability Armor Ballistic Laboratory (SABL)
- Fuels & Lubricants Laboratories
- Water Purification, oil, fuels and lubricants Laboratory
- Fresh Water Test Facility
- NFESC Seawater Test Facility
- Dynamic Structural Load Simulation Lab



TARDEC's Warren, MI operations have a resource value of over $1.1B and occupy 12 facilities on the Detroit Garrison totaling over 936,000 square feet of laboratory space

Army Technical Challenge
More Mobile, Fuel Efficient, Safer Vehicles

Mobility & Energy Efficiency

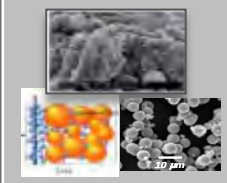
Vehicle Dynamics

Newton-Euler Equations of Motion

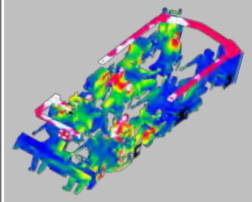
$$\left.\begin{aligned} \mathbf{M}\ddot{\mathbf{q}} + \mathbf{C}_{\mathbf{q}}^{T}\boldsymbol{\lambda} &= \mathbf{Q} \\ \mathbf{C}(\mathbf{q},t) &= \mathbf{0} \end{aligned}\right\}$$

Solve for vehicle mobility and component loads

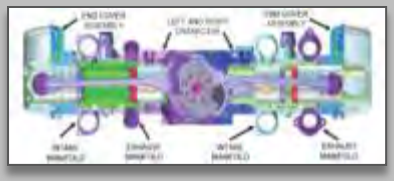
$$\begin{bmatrix} \mathbf{M} & \mathbf{C}_{\mathbf{q}}^{T} \\ \mathbf{C}_{\mathbf{q}} & \mathbf{0} \end{bmatrix} \begin{bmatrix} \ddot{\mathbf{q}} \\ \boldsymbol{\lambda} \end{bmatrix} = \begin{bmatrix} \mathbf{Q}_{e} + \mathbf{Q}_{v} \\ \mathbf{Q}_{d} \end{bmatrix}$$



Hi-Energy, Hi-Density Energy Storage



Comprehensive Thermal Management of Propulsion & Cabin



High Power Density, Low Heat Rejection & Fuel Efficient Engines

Multi-Physics Optimization

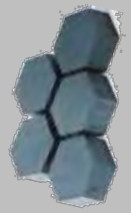
Occupant Centric Survivability

Active Protection Systems

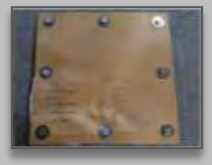
Holistic Occupant Centric Protection

$$\frac{d}{dt}\int_{Vt} f(x,t)dV = \int_{Vc=Vt} \frac{\partial f(x,t)}{\partial t} dV + \int_{Sc=St} f(x,t) \bullet ndS$$

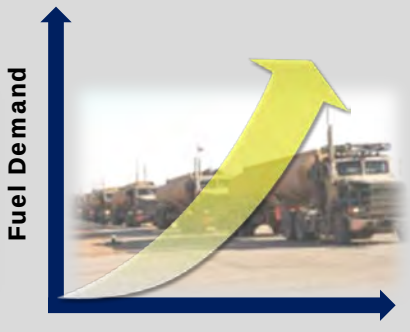
Affordable, Multi-hit Ceramic Armor

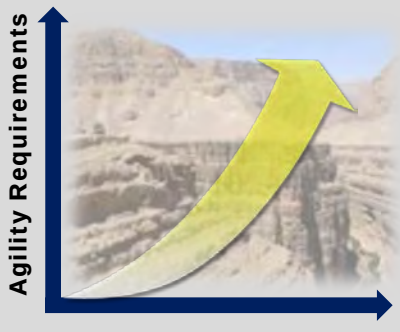


Fire and Toxic Fume Resistant Materials



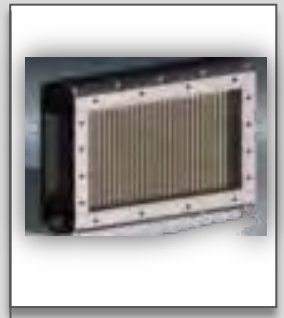
Ground Systems Power, Energy and Mobility



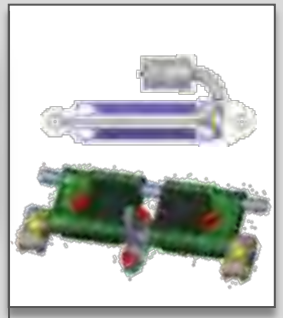


Increasing Demands and Operational Flexibility Require Strategic Investments in Key Areas

Powertrain



Thermal Management



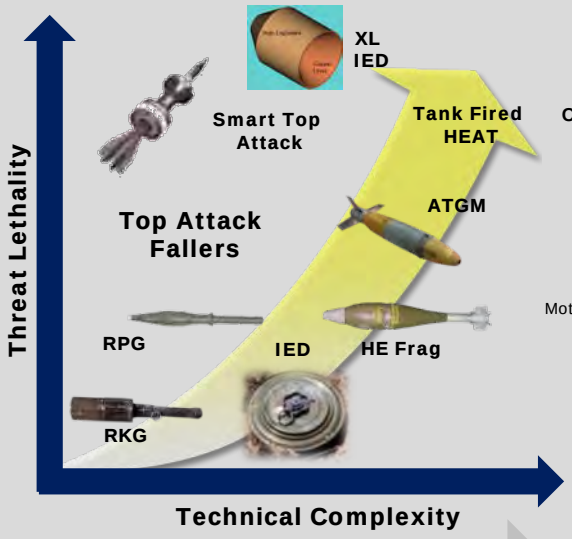
Track & Suspension

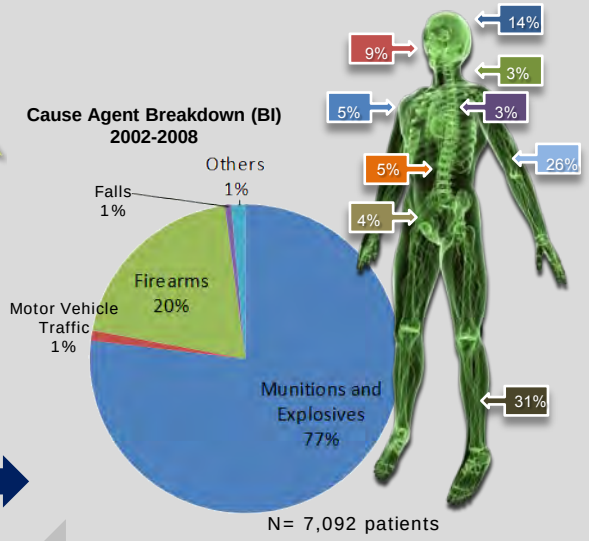
Non-Primary Power

Energy Storage

Advanced Propulsion

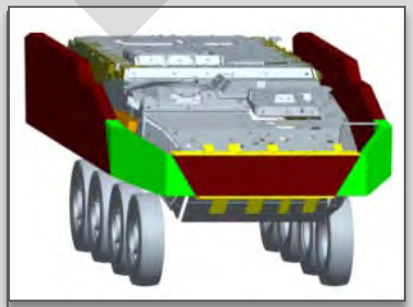
Occupant Centric Survivability





Increasing Demands and Operational Flexibility Require Strategic Investments in Key Areas

Kill Avoidance



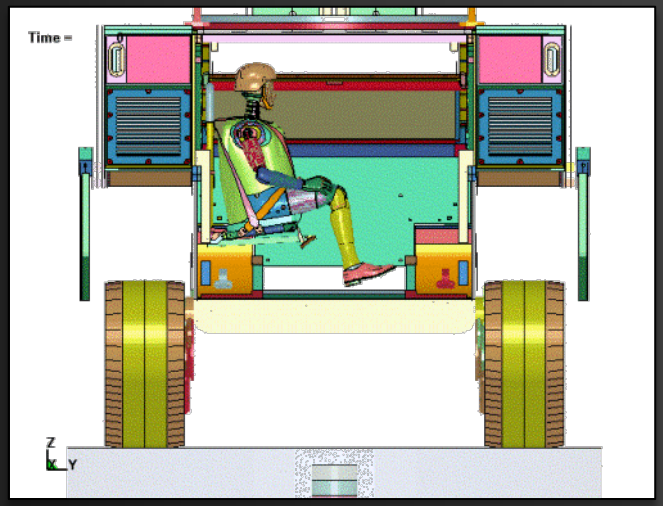
Penetration Avoidance

Hit Avoidance

Detection Avoidance

Underbody Blast

End-to-End Underbody Blast Simulation

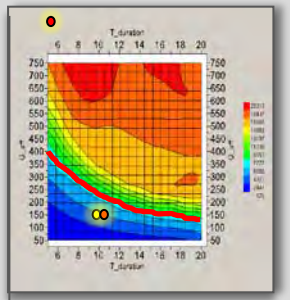


Advanced full vehicle, system level design tools are key enablers to:

- Assessing Occupant Injury Risk
- Developing new protection technologies
- Improving force vehicles for current threats
- Designing new occupant-centric vehicles

Energetic Event (UB Blast)

Component & Platform Interaction



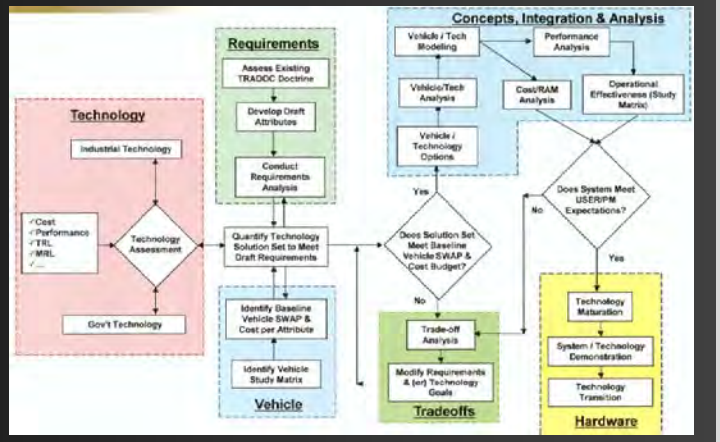
Occupant Injury Response

System Evaluation

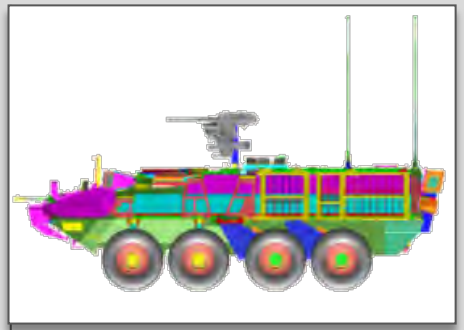
Design Improvement & Optimization

Technology Integration & Engineering

Integration Services:



- Advanced Concepts Modeling
- Physics Based Analysis
- Statistics based analysis in Man-in-the loop simulation
- Integrated System Level Demonstrators and Prototypes
- High Performance Computing & Data Management



Reducing the **Fuel Logistics Burden**

1 in 46
convoys suffered a casualty in 2010, leaving some 3,000 wounded or dead

---

A 1% fuel savings will lead to

6444
fewer Soldier trips in dangerous battlefield convoys

Modeling and Simulation: Optimize the System

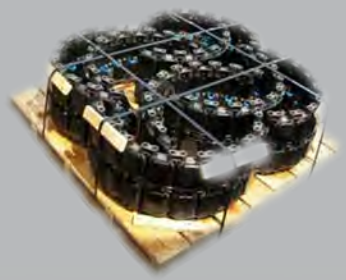
Research and Testing

Demonstrate Systems and Technologies

Reducing the Track Logistics Burden

Abrams T-158LL Track
Bradley T-157I Track

Track System Research



- **Track Systems are the 2nd Highest Operation & Sustainment (O&S) Costs**
- **Abrams T-158LL Track Life is -2,200 miles**
- **Bradley T-157i Track Life is - 3,000 miles**
- **Elastomer Components are the primary failure mechanisms for track systems**

Reducing the Battery Logistics Burden

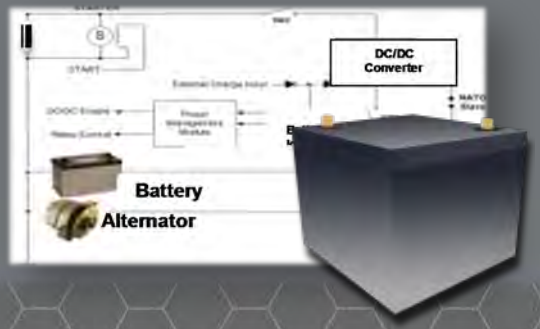
AGM Battery Failures 2002-2008	~250,000
Incorrect Voltage Output	50%
Damaged - Transport Issues	30%
Improper Electrical Performance	20%

Approximately 80% of incorrect voltage failures were serviceable

Improved charging techniques can lead to 2X life improvement

Field Battery Maintenance & Training

Improved Charging

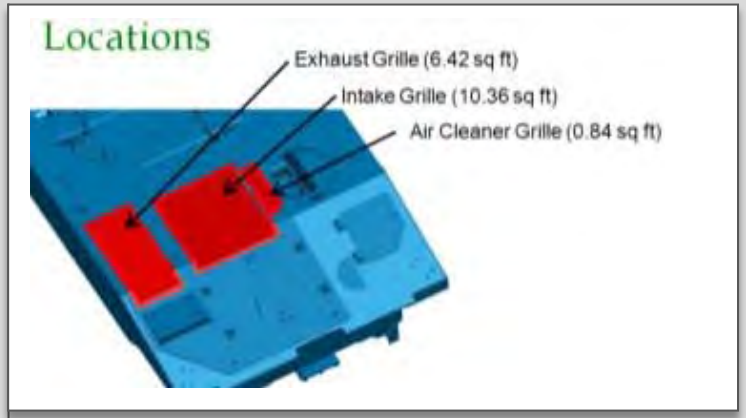


Battery Management

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

Current Projects

Light Armored Vehicle-Recovery (LAV-R)



Paladin Integrated Management (PIM) Air Grills

Stryker Command and Control on the Move (C2OTM)

RPG Defeat Net

Contact Us

Doing Business with TARDEC

TARDEC's Ground Vehicle Gateway is YOUR entry point!

Submit your technology for review

https://tardec.groundvehiclegateway.com

Dr. David Gorsich

david.j.gorsich.civ@mail.mil

BACK UP

The Two Facets of Future Capabilities through the Logistics Lens

Look at
Innovative ways to
Reduce Logistics Burdens

Unburden the Warfighter

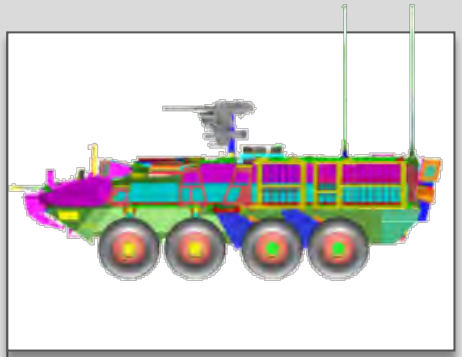
Look to
Design Good Logistics In
From Start

Reduce Unintended Consequences

Technology Integration & Engineering

Integration Services:

- Advanced Concepts Modeling
- Physics Based Analysis
- Statistical-based Hardware & Man-in-the-Loop Simulation
- Integrated System Level Demonstrators and Prototypes
- High Performance Computing & Data Management



Company D
1st Tank Battalion
OEF 2011

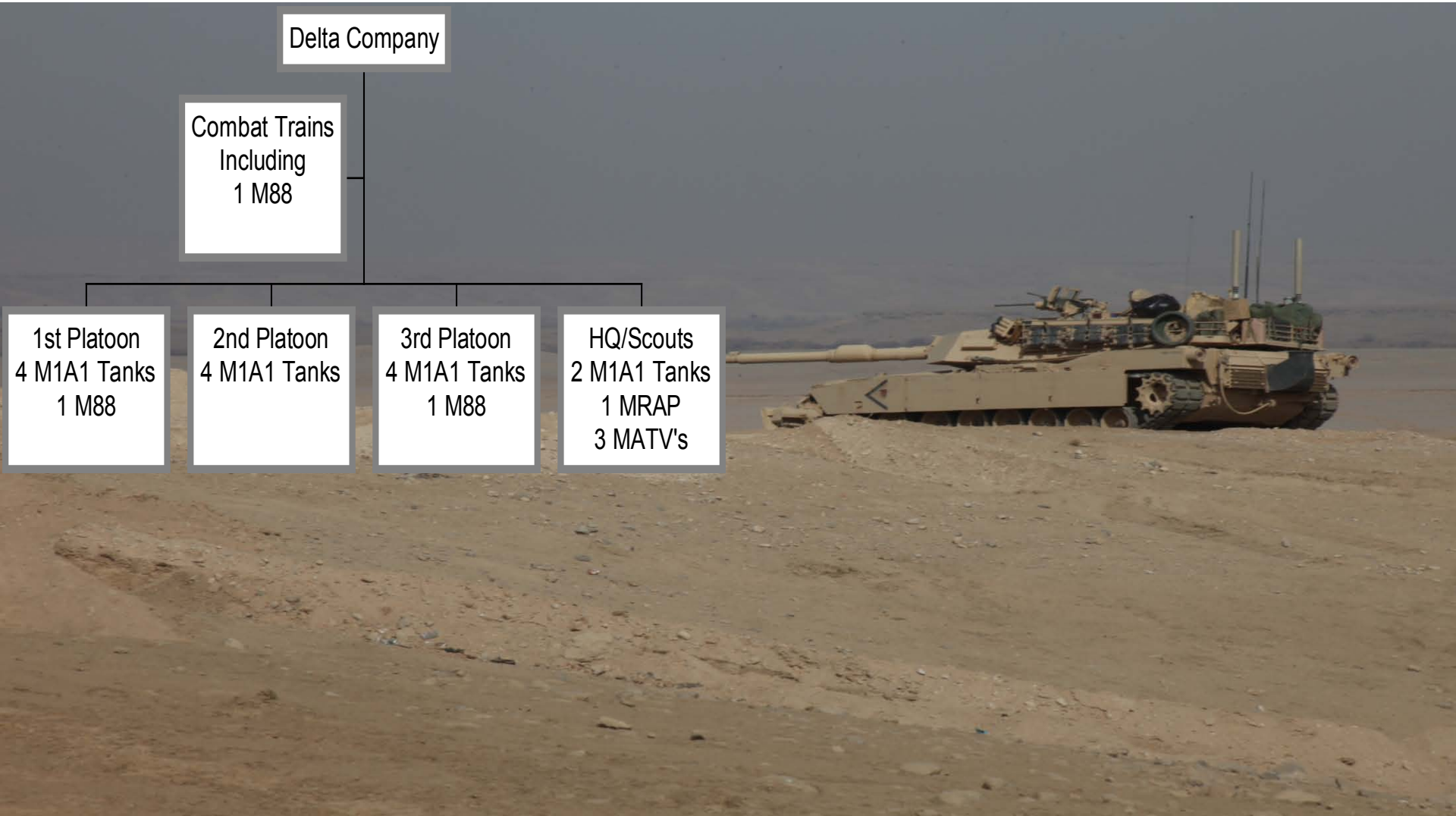
Unclassified

AGENDA

- Overview
- AO Map
- Task Organization
- Modifications
- Command & Control
- Operations
- Logistics/Equipment
- Force Protection
- Questions

Area of Operations

DELTA COMPANY
TASK ORGANIZATION



MODIFICATIONS

- MP-HE Round
- Belly Armor Kit
- Improved Drivers Seat
- CVRJ
- BFT
- Crew Cooling Systems
- Coax brass bag
- Blade/Plow
- FO/FAC Kits

COMMAND & CONTROL

- Delta Company attached to Regimental Combat Team 8.
- Delta Company (-) was in direct support (DS) of BLT 3/8 then V3/4.
- The company established a CLOC co-located with the infantry battalion to monitor MIRC, BFT, SIPR, NIPR, VOSIP and VOIP.
- FWD command was configured with BFT and HPW capabilities.

OPERATIONS

- HQs/Scouts were employed at the Battalion Commander's discretion to conduct disruption and recon missions.
- The tank platoons conducted SBF, Attack by Fire, clearing, disrupting, interdicting, counter – IED, route security patrols, mechanical breaching, BP/Force Protection and limited route clearance.
- Most engagements occurred at 1000 to 3800 meters . Most engagements occurred when insurgents maneuvered on and engaged Marine dismounted patrols.

OPERATIONS

- Multiple attempts to engage tanks with mortars or 82mm recoilless rifles fired in indirect fire mode.
- Very few attempts to engage tanks with RPGs, machine gun or small arms fire.
- Adverse terrain did not affect the mobility or maneuverability of the tank.
- The tank was the only platform in country that was not restricted to established routes or flat and open terrain.
- Tanks operated successfully with belly armor in the heavily vegetated green zone that skirts both banks of the Helmand River.
- Tanks were successfully used on a consistent basis to recover MRAP's and MATV's that had become mired in weather compromised terrain.

LOGISTICS/EQUIPMENT

- T/O and T/E met all requirements placed on the company throughout the deployment.
- Parts failure rates were similar to those experienced in CONUS.
- All logistical support was “pushed” by the tank company combat trains to the tanks in the battle space.
- Majority of maintenance was conducted while the tanks were still operating in the battle space.

FORCE PROTECTION

- Tanks were normally employed with some form of infantry support.
- The IED is still the largest threat to any mounted element in Afghanistan.
- The ambush and direct fire threat to a tanks is insignificant.


FIRST TANK
1
BATTALION
DELTA
CO
Questions???

MAJ Jim Ianitelli

Assistant Product Manager

JERRV / Systems Integration

AMS Mission:

Detect, mark, identify, interrogate, classify, and neutralize suspected explosive hazards, including improvised explosive devices.

Deployment Experience

- **OEF IV – Platoon Leader & Company XO, Bravo Company, 41st Engineer Battalion, Fort Drum, NY**
  - Conducted Area and Route Clearance Operations
- **OIF V – Maneuver Advisor – Border Transition Team 4313**
  - Operations Officer for a Border Transition Team mentoring Iraqi Border Police along the Iranian Border
- **OEF X – 4-4 IBCT, HHC BDE Company & Alpha Company, 4BSTB, 4ID Company Commander**
  - HHC CDR for Task Force Mountain Warrior at Jalalabad Air Field, AF
  - Combat Engineer Company Commander – Land Owner, Maneuver Unit, FOB Commander

Thank You

OEF X – Apr 10

Assassin 6

OIF IV – May 07

Gatekeeper 3

OEF IV – Aug 03

Beast 36

OEF IV

- Area and RTE Clearance
- First RCVs in OEF Pictured
- COTS vehicles; importance of these vehicles and their mission quickly realized
- Lots of VIP visits

OIF IV

OEF X

OEF X Cont.

- Vehicles continue to receive survivability upgrades throughout our deployment

War Story – Taliban CP

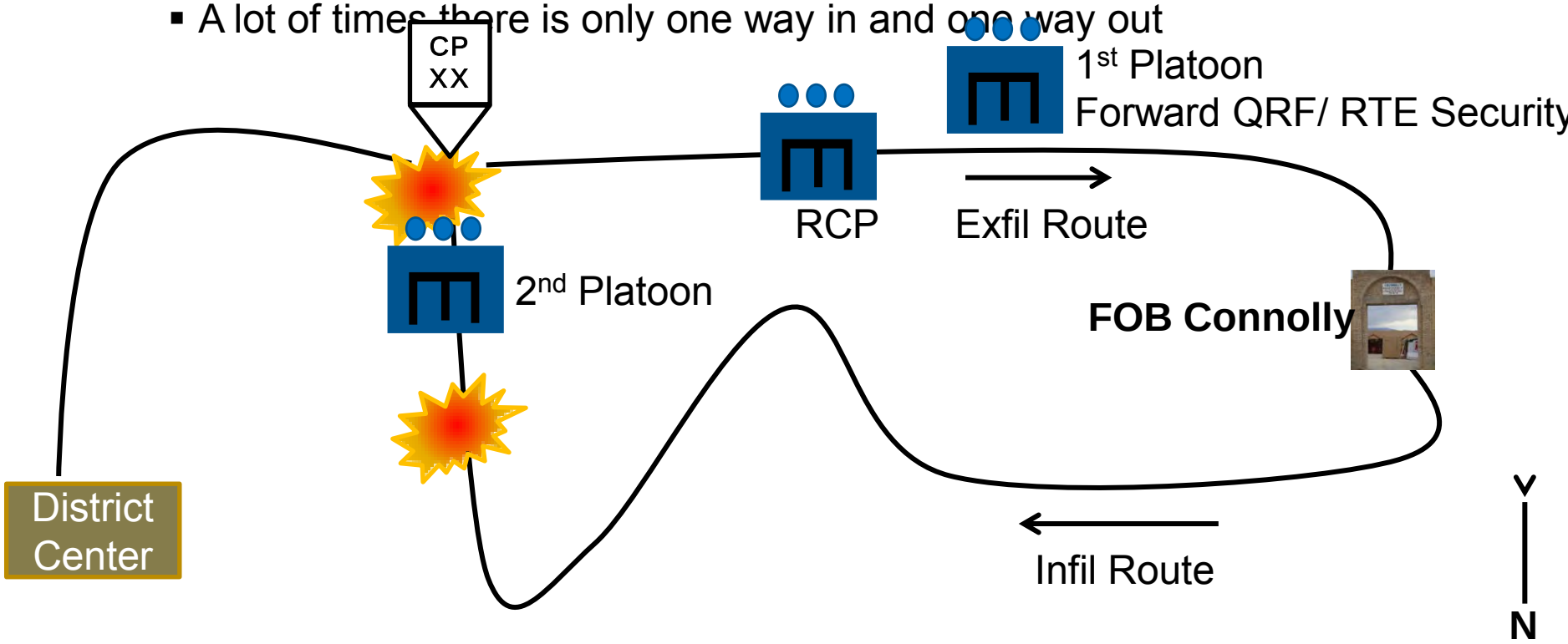
- **Intent: Just tell it how it is…**
- **Not going to give suggestions just want to make everyone think.**
- **Mission First – With all the equipment we currently have and are currently developing, one must always remember that there is a mission that needs to be accomplished first and foremost.**
- **Focus on educating Lead and limitations of your sy**
- **Our mission during OEF was governance and development.**
- **Our FOB AO included three districts in Nangarhar Province.**

War Story – Taliban CP Cont.

- **Mission: ANA, with support from 2nd Platoon, A Co, conducts COIN operations in the vicinity of illegal Taliban CP.**
  - Taliban would react to FOB RIAB (Radio In A Box) messages by smashing locals radios, robbing locals, act of intimidation. RIAB messages would:
    - Promote local government, ANSF, Coalition support
      - Messages from District Sub-governors, ANSF Leadership to include Army, Police, Boarder Police and Customs Leadership.
    - News – Local and World current events
    - Discredit Taliban and their activities
    - ANA Mullah broadcasts along with Call-to-Prayer broadcasts
    - Call in shows for local residences
    - Educational Broadcasts (ex. The long term affects of Poppy Farming)
  - ANA with local police show presence
  - Distribute 200 radios to local citizens
  - Distribute 500 pens with FOB call in number

War Story – Taliban CP

- **Alternate route utilized to get to Taliban CP, 2nd Plt is ambushed.**
  - Route Clearance not utilized for infil but used for exfil
  - Ranger School tactics vs. Real World limitations
    - A lot of times there is only one way in and one way out



2nd Platoon is Ambushed While Heading to CP 515

Inside an RG-31 during an Ambush

The U.S. Army Stryker Brigade Combat Team

SGM Brandon Jenks TCM-SBCT Sergeant Major, Ft. Benning, GA.
25 October 2011

Agenda

- Stryker characteristics and capabilities
- SBCTs flexibility
- Stryker performance in Afghanistan
- Successes in OEF
  - Increased SA
  - Casualty Evacuation
  - MGS
- Challenges in OEF
  - IEDs and training
  - Mine Detectors
  - Vehicle Recovery
- True strength of an SBCT
- Questions / Discussion

SBCT Capabilities and Characteristics

- Very, very good truck!
- Eight wheeled armor vehicle
- Carries a 3 man crew, and 9 man infantry squad
- Travels up to 70 MPH
- Strategic, operational &tactical mobility
- Superior Infantry carrier vehicle
- Armed with an Remote Weapons Station (RWS)
- .50 Cal Machine gun and/or MK-19 40 MM Grenade launcher

Stryker

Stryker

Afghanistan

The U.S. Army Stryker Brigade Combat Team

AMERICA'S FINEST

The Stryker Brigade Combat Team

Questions/Discussion

TCM–SBCT Contact information

SGM BRANDON T. JENKS

Sergeant Major for TRADOC Capability Manger, Stryker Brigade Combat Teams

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Fort Benning, GA. 31905

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Office: 706-545-1332
Cell : 706-604-4360
Fax: 706-545-5355

LAV-25
1984-2003

LAV-25 A2
2007-2025

USMC FOLAV Overview

NDIA 2011 Combat Vehicles Conference

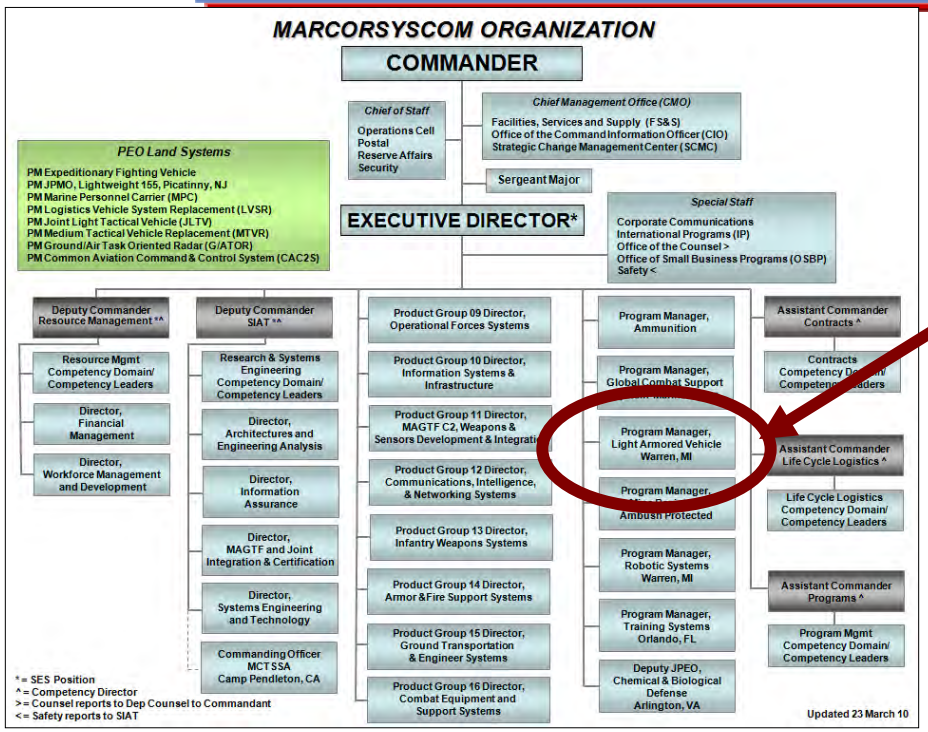
Dearborn, Michigan
25 Oct 2011

Major Henry Kayser, USMC
Operations Officer, Light Armored Vehicles

Agenda

- Overview of PM LAV
- LAV-C2 Upgrade Program
- LAV-AT Modernization Program
- LAV-R Upgrade Project
- Survivability II Project (SURV II)
- Survivability III Program (SURV III)
- Electrical Upgrade
- LAV Indirect Fire Modernization Program
- LAV Sustainment Efforts
- Industry Opportunities
- Conclusion

A Unique Organization



A MCSC Program Office Located at the Army's TACOM Life Cycle Management Command Staffed with Marines and Army Acquisition and Sustainment Professionals

PM LAV represents MCSC interests within the TACOM LCMC. The PM/DPM has membership on the LCMC Board of Directors and the LCMC Real Property Planning Board

With Defined Guidance

VISION

For the LAV Team to Achieve World Class Leadership in Innovative Systems ***ACQUISITION*** and Effective ***SUSTAINMENT*** of Armored Vehicles

MISSION

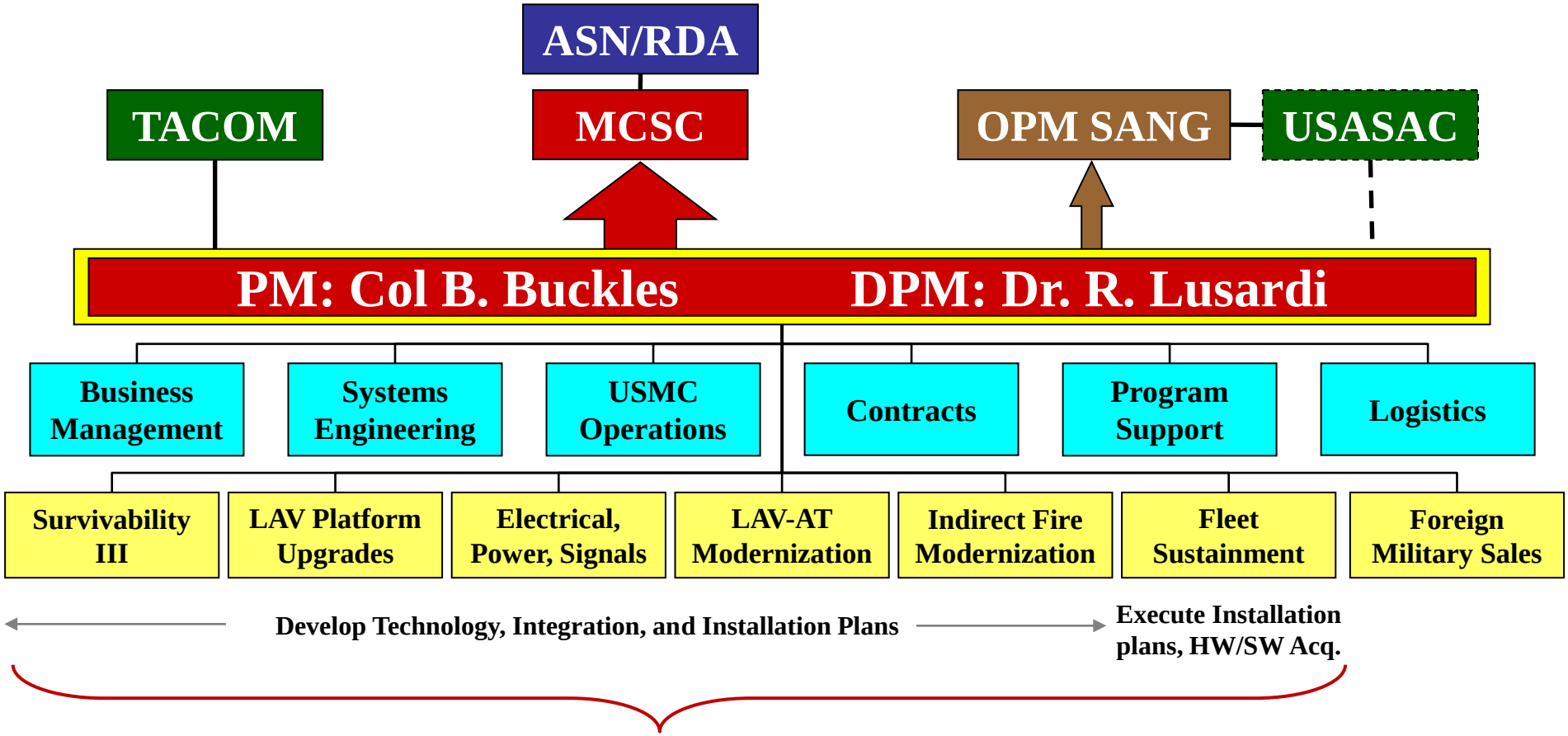
Provide Technologically Superior Weapon Systems While Supplying ***FOCUSED LIFE CYCLE MANAGEMENT*** to Our Customers through Research, Development, Acquisition, and Life Cycle Support of Light Armored Vehicle Systems.

VALUES

CUSTOMER SATISFACTION

Professionalism
Integrity
Honesty
Teamwork

PM-LAV Table of Organization



Upgrade & Sustainment of USMC LAV Fleet

99 Employees **18 Contractors** **11 Marines**

PM-LAV Programs

- 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 2025.


History of Light Armored Vehicles

1970s	1980s	1990s	2000s
GEN I	*GEN 1.5*	*GEN II*	*GEN III*
	 *SWIMS*		
PIRANHA 6X6 - CANADA	USMC LAV (7 VARIANTS) **Oct 26th 2008, Marine Corps Celebrated "25th" Anniversary of LAVs in service**	CANADIAN BISON  SANG (11 VARIANTS) AUSTRALIA *SWIMS*	USA STRYKER (10 VARIANTS) -NEW ZEALAND -CANADA

USMC LAV Fleet

LAV-AT

LAV-C2

LAV-25

LAV-L

LAV-M

LAV-R

Status of Marine Corps Light Armored Vehicles

1980's | 1990's | 2000's | 2010's | 2020's | 2030's

Initial Procurement of LAVs (7 Variants)

IROAN – SOAR PROGRAM AT THE DEPOTS

Rapid Acquisition Modifications (RAM)

FIELDED — **Service Life Extension Program (SLEP) LAV-A1**

FIELDING — **LAV-A2 Upgrade Program**

FUNDED/ FOT&E FY09 — **C2 Upgrade Program**

PARTIALLY FUNDED — **Survivability Part II** (Ballistic Seats, Fuel Cell, Underbody)

FUNDED — **LAV-R Upgrade Program**

FUNDED — **LAV-AT Upgrade Program**

PARTIALLY FUNDED for POM12 — **Survivability III** (Power Pack, Suspension)

POM12 Funded — **LAV-M Upgrade**

POM14 Submission — **Electrical Upgrade**

No Upgrade Zone

2025 LAV Service Life

2006-2010

LAV A2 Upgrades

-Ballistic Protection Upgrade
-Auto Fire Suppression
-Gen II Suspension
-Electric Turret Drive
-Mine Protection Kit

Fleet Modifications

-Ballistic Blankets
-Blast Shields
-Blue Force Tracker
-Cooling Vests
-Driver Protection Kit
-MRV Weapons Mount
-Overhead Cover
-Collapsible POL Racks
-Scissors mounts
-Sustainment (e.g.EPLS)

End of Service Life: 31 December 2025
Oldest Age LAV: 26 years old
Average Age LAV: 20 years old

LAV-C2 Upgrade Program

- The LAV-C2 Upgrade provides an improved communications suite which consists of the following:
  - new vehicular intercommunication system,
  - five computer workstations,
  - improved high frequency radio,
  - improved satellite communications,
  - situational awareness & fire support systems software/hardware,
  - power distribution/management,
  - cosite mitigation, and
  - improved HFE.
- Being fielded.

LAV-ATA2 Modernization Program

DESCRIPTION

❑ The objective is to improve the supportability and mission effectiveness of the LAV-ATA2s by providing the following "mission suite upgrades" on **118** of the Anti-tank vehicles. Of the 118 systems, 115 will be used to upgrade or replace the LAV-ATA2 turrets in the current inventory, 3 will be allocated to cover the remainder of the AAO (i.e. 115+3 = 118)

❑ The LAV-ATM program has been designated as an ACAT III program

CHARACTERISTICS

An Anti-Tank Guided Missile (ATGM) weapon station with:

❑ **Improved reliability**, availability, and maintainability

❑ **Multiple reload capability** and ability to **acquire targets while on-the-move**

❑ Provide LAR Battalion with a precision long-range capability to destroy enemy tanks

❑ An improved thermal sight and an advanced fire control system (Modified Improved Target Acquisition System (MITAS)) capable of firing the **current and next generation heavy anti-armor missiles** and ensure training commonality

STATUS

❑ In Source Selection

❑ Award planned for December 2011

LAV-R Upgrade Project

CHARACTERISTICS

- The proposed upgrade to the crane, generator and winch is more supportable and provides greater lifting and pulling capability. A modern winch with synthetic rope will replace the barrel winch.
- A modern knuckle crane that will increase lifting capabilities and reliability of the entire subsystem.
- A new generator will supply more power for electric tools and the welding system.
- TARDEC Ground Vehicle Integration Center (GVIC) is serving as the system integrator and are developing interface designs, conducting integration, and providing test support.

DESCRIPTION

This Program is being pursued to replace the current HIAB-FOCO 650/1 ALT crane, hydraulic generator, and Hub 30 Braden barrel winch.

The upgrade will provide a more modern crane, 13 kw generator, and new winch and replace the old PTO that was a long lead item with a COTS item.

LAV Survivability II

- Self-Sealing Fuel Cell
  - Contract Awarded

LAV Survivability III

- Advanced Suspension
  - Includes more than just suspension upgrade, also includes:
    - Central Tire Inflation System (CTIS)
    - Anti-Lock Braking System (ABS)
    - Ride Height Management
    - Load Leveling/Sharing
  - Improved ride quality reduces O&S costs
- Power Pack

Electrical Upgrade

- Modernize the electrical system for all LAV variants
  - Replace the electrical system with solid-state power management and new turret slipring
  - Replace analog components with CAN J1939 based digital backbone
  - Common displays for driver, vehicle commander and other crew locations
  - Provides improved troubleshooting and diagnostics reducing supply support costs
- Solution is being developed
- Full and open competitive contract

LAV Indirect Fire Modernization

Description

- Upgrade 71 LAV-Ms with automated extended range 81mm system
- Improves range and responsiveness.
- Will provide the LAR battalion and independent companies with an organic fire support capability that can adequately range threat systems.
- Potential ACAT IV-T Program

Planned Schedule

• MS B	3rdQtr, FY13
• Contract award	1stQtr, FY14
• MS C	3rdQtr, FY15
• Vehicle upgrades	3rdQtr, FY15-3rdQtr, FY18
• IOC	1stQtr, FY18 (1 Bn/ 2 –Ms)
• FOC	3rdQtr, FY18

Status

- FY12 New Start
- Milestone document development initiated

LAV Sustainment Efforts

- PM LAV Portal (Integrated Digital Collaborative Environment)
- Joint Asset Maintenance Integrated Support System (JAMISS)
- Total Life Cycle Management – Assessment Tool (TLCM-AT)
- Tactical Vehicle Sustainment Test Bed (TVSTB)
- Portal Maintenance Aids
- Institutionalized Condition Based Maintenance (CBM+)
- CMMI Level 2 Certification
- Reliability Centered Maintenance (RCM)
- Business Case Analyses (BCA)
- Energy Initiatives

Industry Opportunities

- Increased capability
  - Decreased cost, weight
- Lighter materials
- Address capability gaps
- Capability enhancement

Meeting with PM-LAV

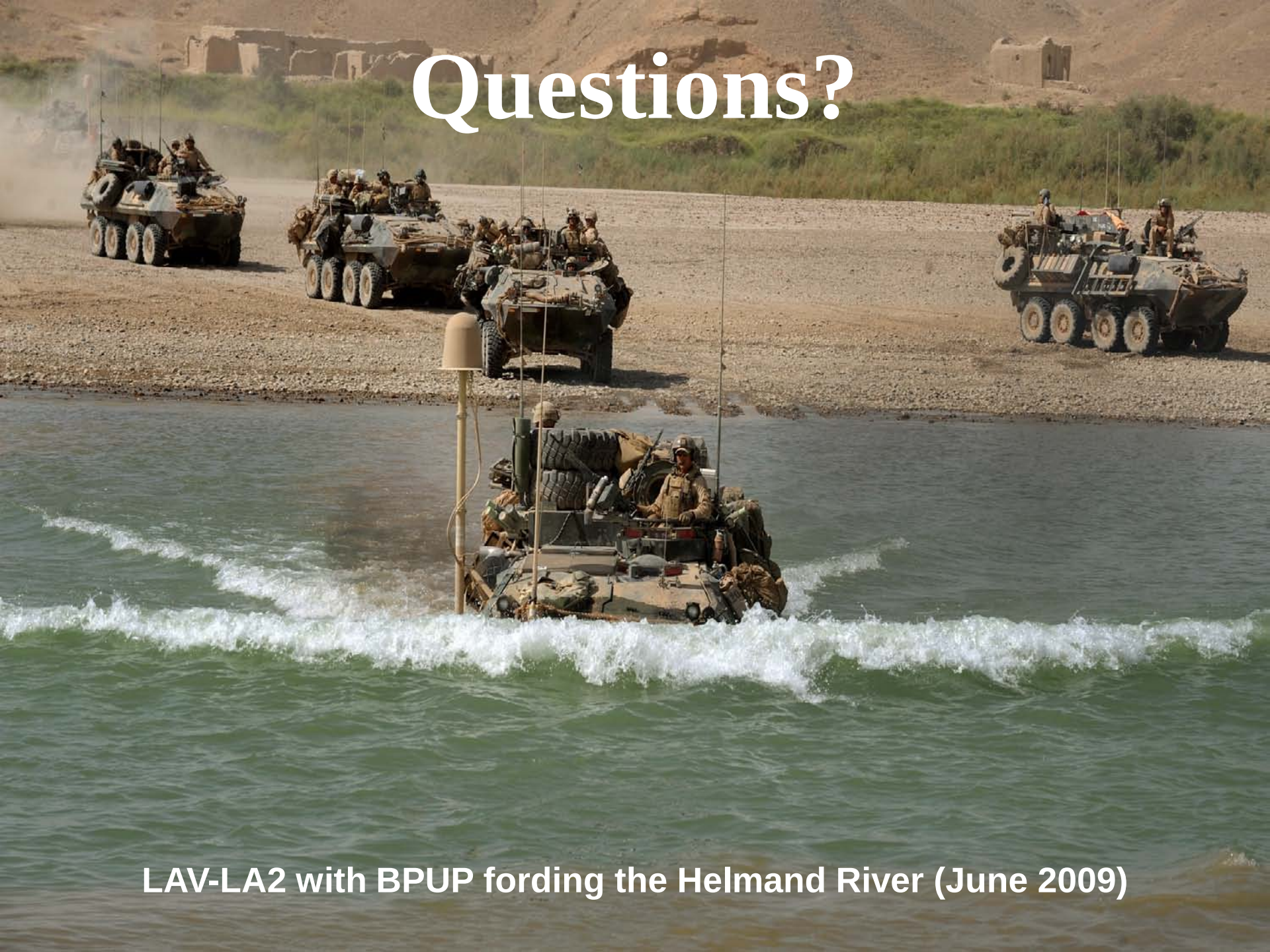
- Send an email/call
  - BPT provide your product description
  - If interested, PM-LAV will coordinate a meeting time
- Plan on speaking 45 minutes with 15 minutes Q&A
- Be on time
- TRL 6+

Conclusions

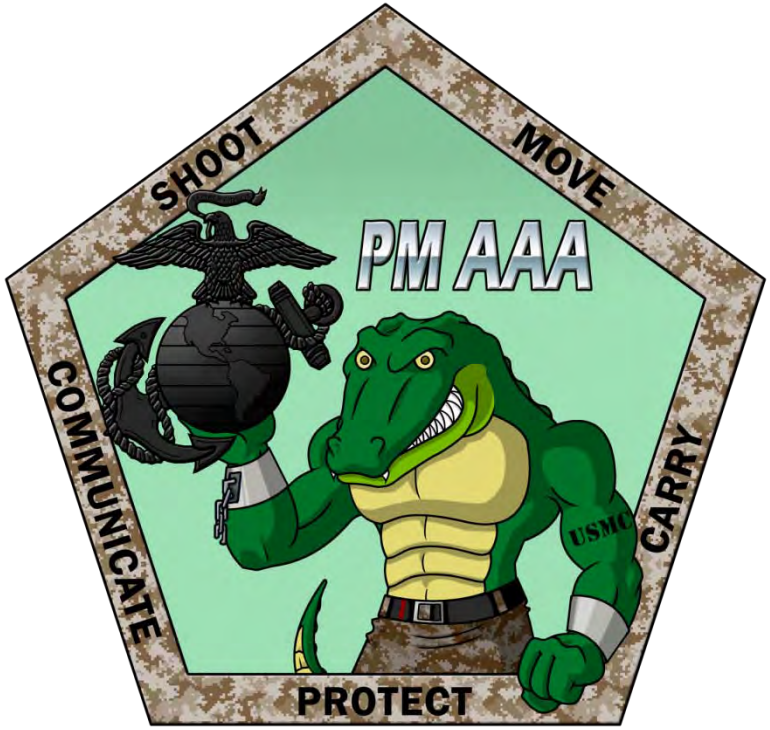
PM-LAV Challenges:

- Upgrade and sustain the FOLAV to maintain its relevancy until 2025… and potentially 2035
- Develop and incorporate product support strategies that minimize TOC across the fleet

Questions?



LAV-LA2 with BPUP fording the Helmand River (June 2009)



PM AAA
NDIA Conference
25 October 2011

AMPHIBIOUS VEHICLE WAY AHEAD

Overarching Facts

- Joint Operational Access capability is required across the range of military operations
- 2 Marine Expeditionary Brigade (MEB) Assault Echelons is the minimum required forcible entry sea-based capacity for Operational Access and supports crisis response, security cooperation and theater engagement requirement
- 2006 Strategic Planning Guidance (SPG) guidance to better balance the Ground Combat Tactical Vehicle (GCTV) Portfolio resulted in a track/wheel mix of Armored Personnel Carrier (APC) capability (8:4 ratio) in order to meet the Service capacity requirement of 12 battalions of lift for Marine Corps operational scenarios

Acquisition Programs

- Assault Amphibious Vehicle (AAV) Upgrade increases force protection and vehicle survivability levels of the current capability in order to sustain operations ashore against current threats to extend its service life until replaced by the Amphibious Combat Vehicle (ACV) and Marine Personnel Carrier (MPC).
- ACV will provide sea-based entry and land maneuver capability to come from over the horizon (12-18 NM)
- MPC supports expeditionary protected mobility requirements by enhancing Marine Operating Forces' tactical & operational mobility with balanced levels of performance, protection & payload

TRANSITION FROM EFV TO ACV
Requirements Development

- Systems Engineering OPT
  - Evaluate cost & technical risk associated with requirements (water speed, survivability, lethality eg.)
  - Evaluate various system concepts to better define capability versus affordability trade space
  - Utilize data to develop systems concepts for use in the AoA
  - Systems concepts evaluated represent a continuum from minor upgrades to the legacy platform up to high-end new vehicles

- New Efforts in Support of ACV Requirements Development
  - Hull demonstrator to explore achievable protection levels in an amphibious tracked vehicle
  - Market research/trade study of remote weapon systems & variable height suspensions
  - Evaluation of suitability/effectiveness of remote weapon systems for AAV, MPC, or ACV

A PORTFOLIO APPROACH TO COMPLEMENTARY CAPABILITIES

➢ Overarching CD&I Objective:

— ***Marine ground combat forces require expeditionary protected mobility throughout the extended littoral operational environment across all types of terrain***

- ***ACV & MPC are part of a portfolio of capabilities that provide closure to real world operational gaps and shortfalls in the ability of the MAGTF to conduct ground based maneuver tasks***
- ***The MPC, as the medium capability category platform, provides a bridge in capability between the ACV and JLTV***
- ***Distributed Combat Power - 2 MPCs will lift a reinforced rifle squad***
- ***MPCs will be supported by JLTVs carrying heavy weapons, communications equipment, and cargo***
- ***In conjunction with ACV the MPC will meet GS lift requirements for Marine Infantry across the ROMO***
- ***ACV is optimized for JFEO/MCO while MPC is better suited for the fight in restricted terrain against irregular threats***

"Our Ground Combat & Tactical Vehicle Strategy is designed to field and support a portfolio of complementary capabilities - <u>No one vehicle can do it all</u> while being affordable and singularly operationally effective across the ROMO".

AAV UPGRADE

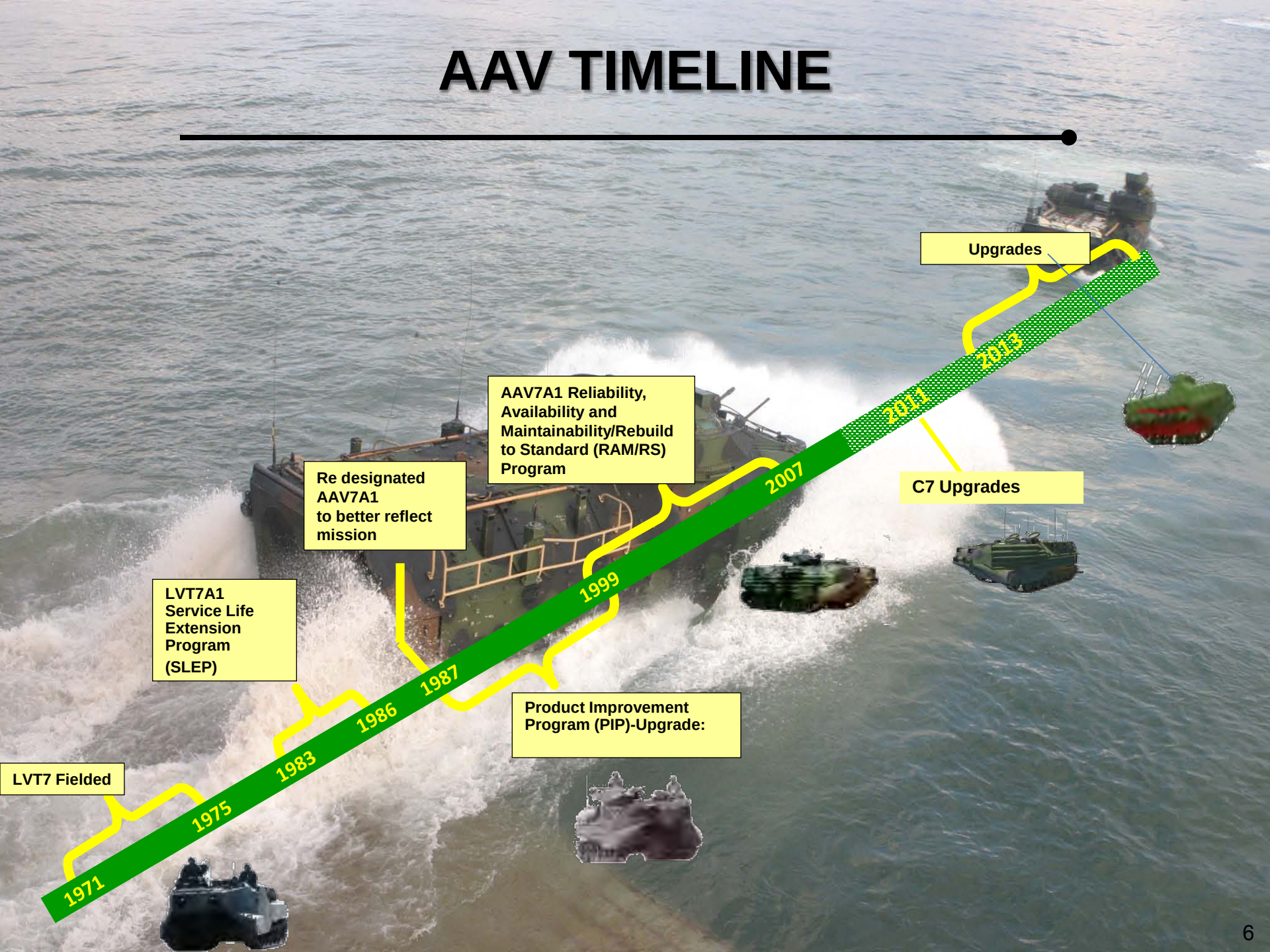
Mission: General Support Lift / Amphibious Mobility
Dimensions: H: 130 in
W: 130 in
L: 321 in
Wt: 46,330 lbs (curb wt)
Weapons: HMG
Payload: 21 Infantry Marines + 3 Marine crewmen
Range: 200 miles
Speed: Effective with M1A1 off-road / 6 knots in water

Acquisition Status: Pre MS-B
Acquisition Objective: 392
IOC/FOC: FY17/FY23
Approximate Unit Cost to Upgrade: $1.5M

- AAV Upgrade AAO provides 4 Infantry Battalions lift capacity to the MAGTF

- *The AAV Upgrade is to be a bridge capability to ACV. Focus - restore operational relevance to the AAV by updating outdated protection attributes*

AAV TIMELINE



AAVC7 C2 UPGRADE/ FUTURE UPGRADES

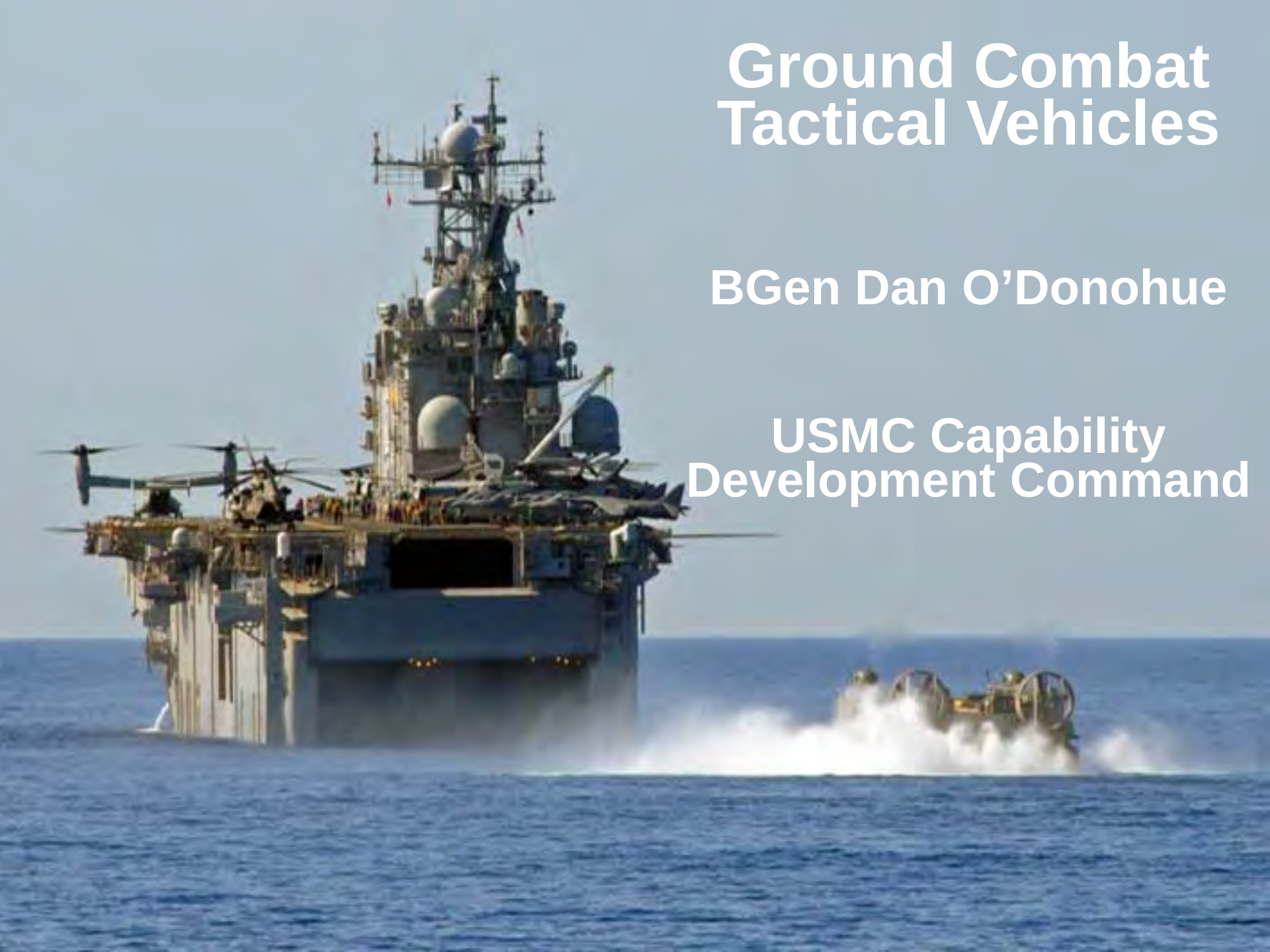
- **Current C7 Upgrade**
  - C7 AAO of 76 vehicles to be upgraded
    - 60 vehicles to be fielded prior to August 2011; production closed out with SPAWAR
    - 16 remaining vehicles to be completed in coordination with MPS backloads/IROAN
    - IIP (spares) at SMU/RIP
  - NETT
    - CAB only command remaining
- **Future Upgrades as of September 2011**
  - Underbody armor
  - Sponson armor
  - Blast mitigating seats; crew and troops (3+17)
  - Contact and spaced spall liners
  - Fuel tank protection
  - Spray in Floor Liner & blast mitigating liner
  - Engine/transmission and supporting components upgrade to support added weight
  - Suspension and dual pin track

WHY AMPHIBIOUS COMBAT VEHICLE

Summary of Capability Gaps*

- When required to conduct amphibious operations and subsequent operations ashore in a denied or contested environment, the legacy platform (Assault Amphibious Vehicle) presents the following capability gaps
  - Water/Land Mobility: Cannot close to the beach from extended launch distances prescribed in future Navy CONOPS
  - Protection: Cannot protect its occupants from IED's
  - Network: Cannot communicate critical information requirements to the sea base
  - Lethality: Cannot achieve direct fire overmatch against threat peer vehicles identified in the System Threat Assessment Report

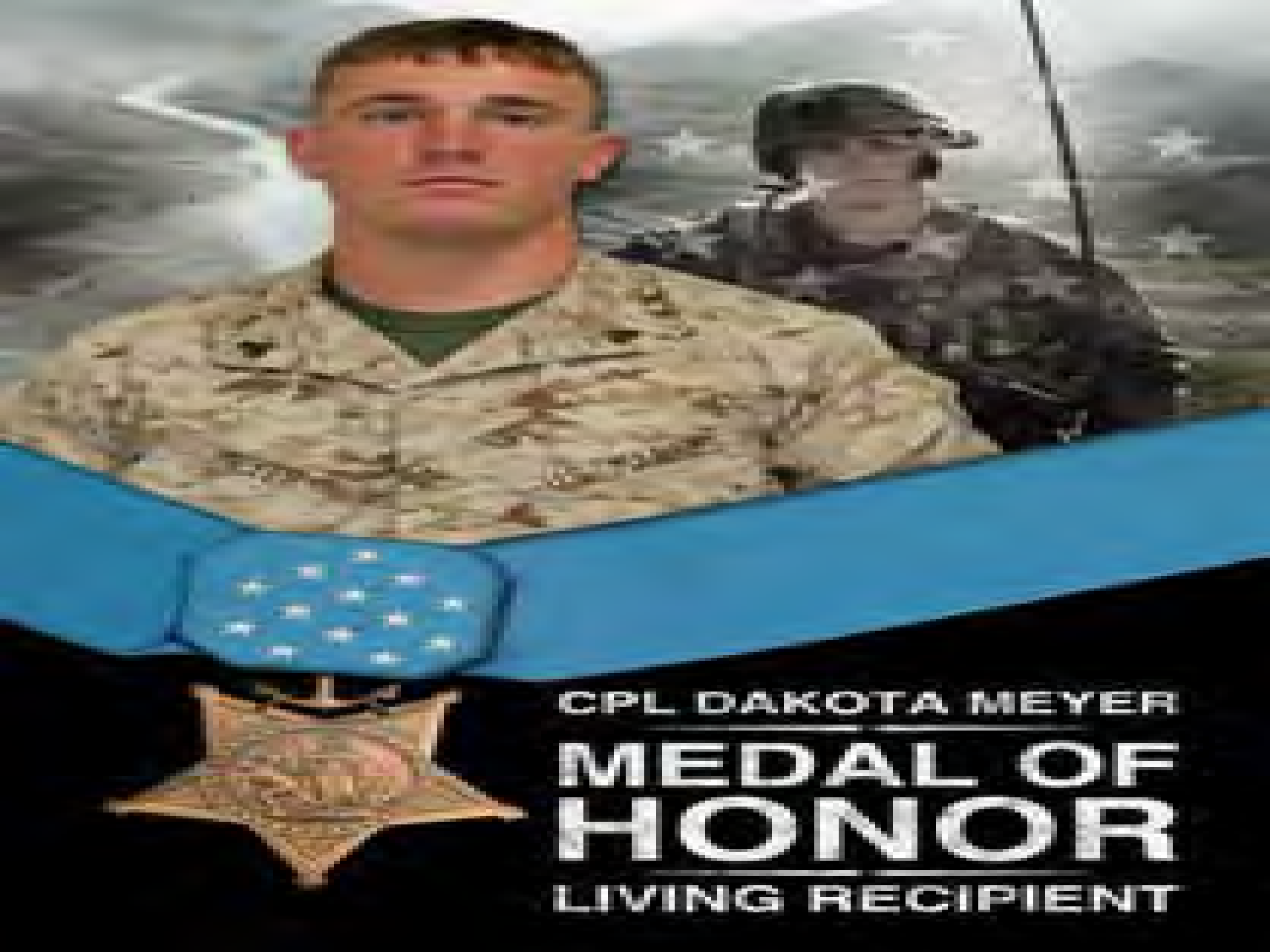
*Amphibious Combat Vehicle Initial Capabilities Document, pages 12-13



Ground Combat Tactical Vehicles

BGen Dan O'Donohue

USMC Capability Development Command

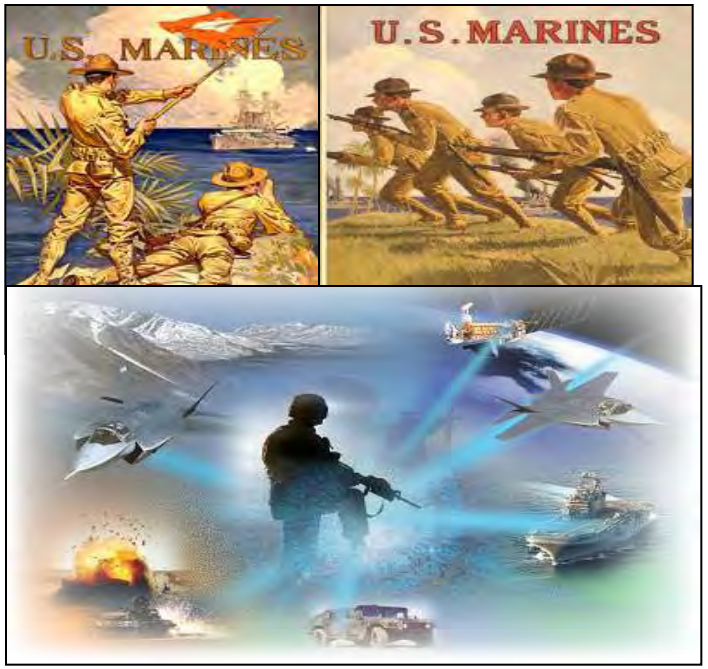

CPL DAKOTA MEYER
MEDAL OF
HONOR
LIVING RECIPIENT

Joint Expeditionary Force in Readiness

Core Missions

Crisis Response

Assuring Littoral Access



Historically Based Knowledge, Expertise & Success

The World We Live In…What We Expect…

Wars Amongst the People

Hybrid Threats

Sea lanes

Sea lanes

Sea lanes

Sea lanes

Sea lanes

Sea lanes

Access challenges…

Largely in the Littorals

Complex Terrain

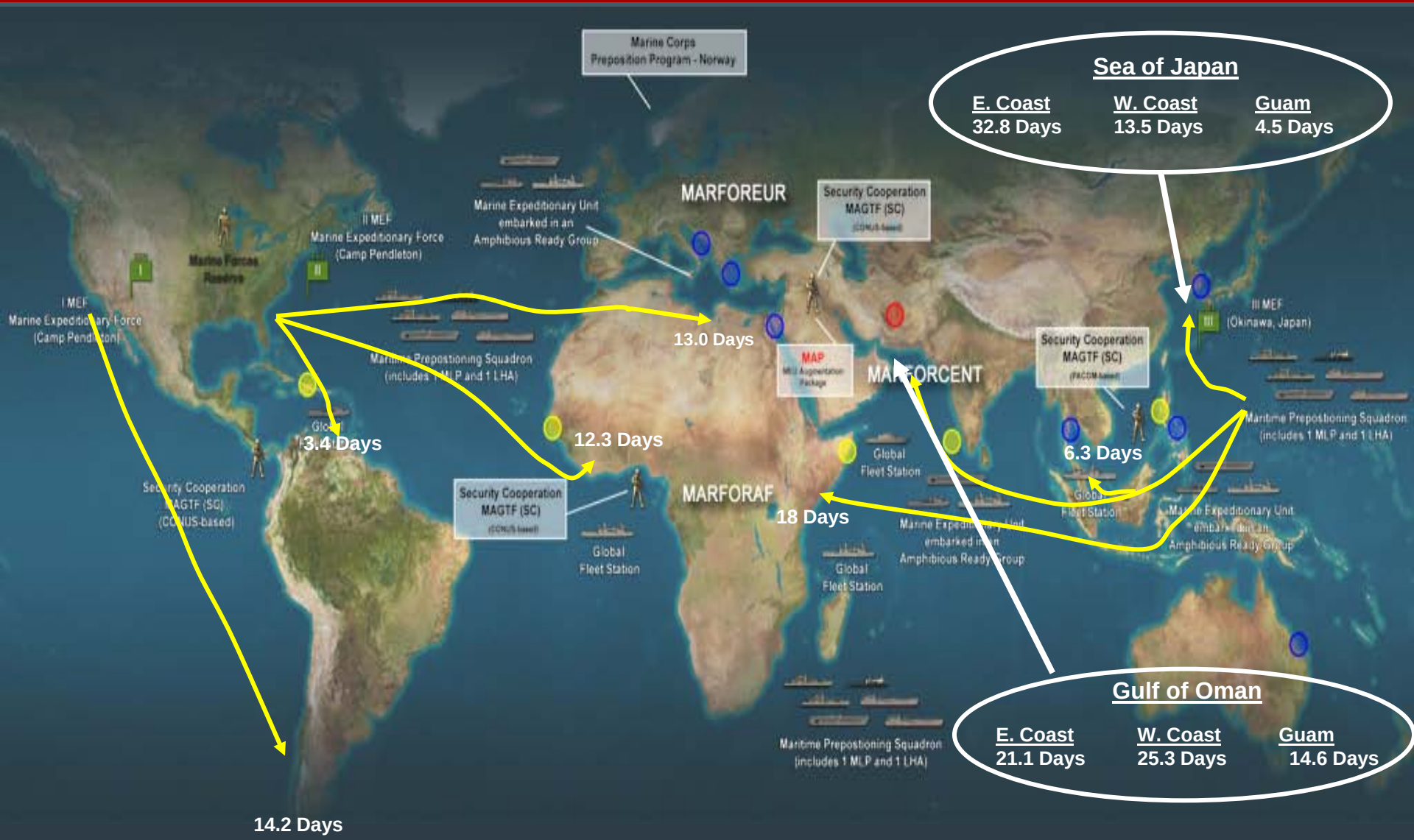
Information Environment

- 75% of people live w/in 200mi of a coast
- 70% of world is water
- 95% of international communications travels via underwater cables

- 23,000 ships are underway daily carrying 90% of the world's international commerce
- 49% of the world's oil travels through 6 chokepoints
- 25% of the world's oil and gas is drilled at sea

A Maritime Nation with global responsibilities

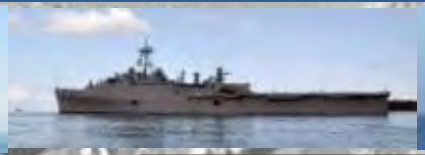
Strategically Relevant



26th Marine Expeditionary Unit

BLT 3/8, VMM-266 (REIN), CLB–26 **DEPLOYMENT DATES: AUG 2010 – *MAY 2011***

USS KEARSARGE (LHA-3) ***USS PONCE (LPD-15)*** ***USS CARTER HALL (LSD-50)***



JORDAN OPERATIONAL DEPLOYMENT PROGRAM
22 NOV 10 – 4 DEC 10

ODYSSEY DAWN
19-30 MAR 11 – Air strikes
22 MAR 11 – Recovery ops

OEF Combat Ops
JAN 10 – MAY 11

PAKISTAN HA/DR
4 SEP 10- 10 NOV 10

SHAMAL 10
9 – 20 NOV 10

IRON MAGIC
12-23 DEC 10

JOINT OPS
Sep-Dec 10

EDGED MALLET
15-29 NOV 10

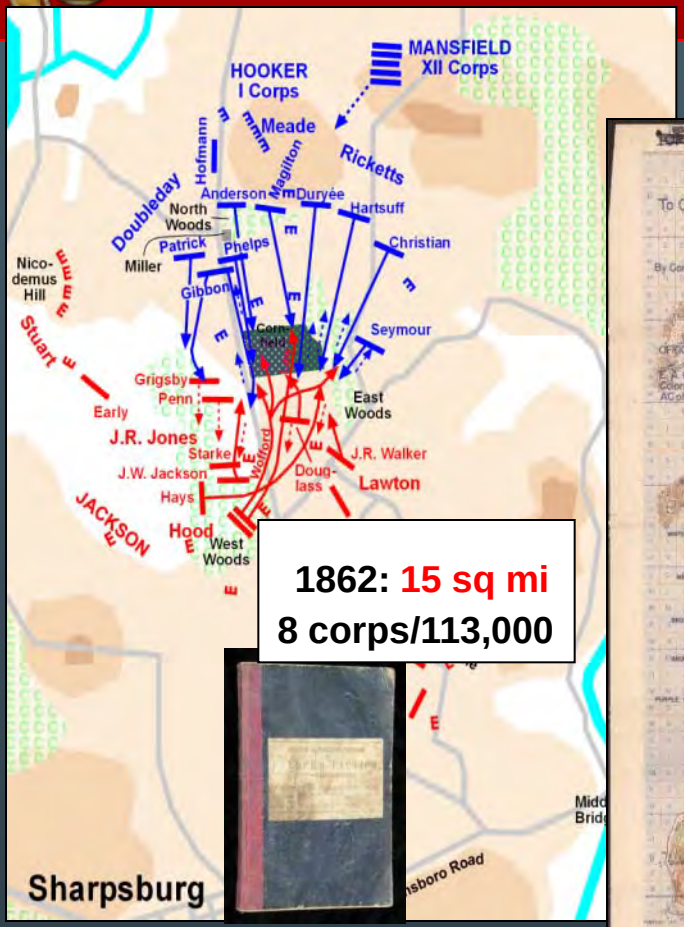
Aug 2010: Deployed one month early to Pakistan
Sep-Nov 2010: Humanitarian relief 400 miles into Pakistan
Sep-Dec 2010: Operations and engagement in Persian Gulf, Jordan, Kenya and Horn of Africa
Jan 10–May 11: Combat ops in Helmand Province, AFG
Feb 2011: Egypt contingency response from the Red Sea
March 11: Ordered to execute operations in Libya
Reinforced from Camp Lejeune
MV-22s self deploy from CENTCOM to Med.
March 2011: Strike operations and recover downed airmen in Libya
May 2011: Return to Camp Lejeune, NC

If Not an ARG/MEU Then What?

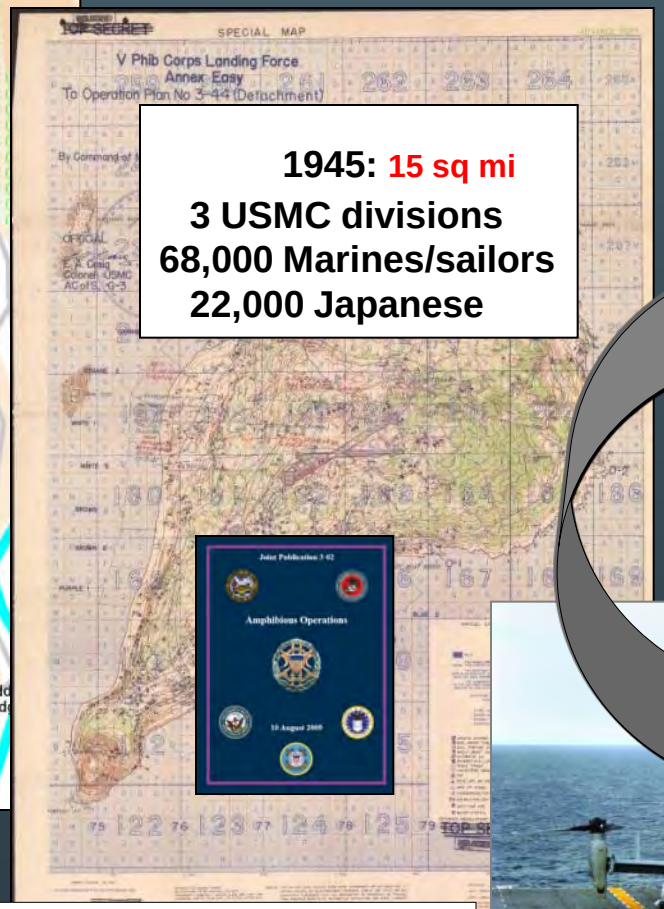
Ship to Objective Maneuver

- Mobility
  - Vertical & surface options
  - Capability & capacity for high & low-end
- Command and Control
  - Decentralized execution & common picture
- Intelligence
  - Locate & identify forces & impediments to mobility
  - Pull vice push information
- Fires
  - Immediate & responsive – all weather – lethal & non lethal
  - Unmanned systems
- Information Operations and Computer Network Operations
- Sea-based Operations and Logistics

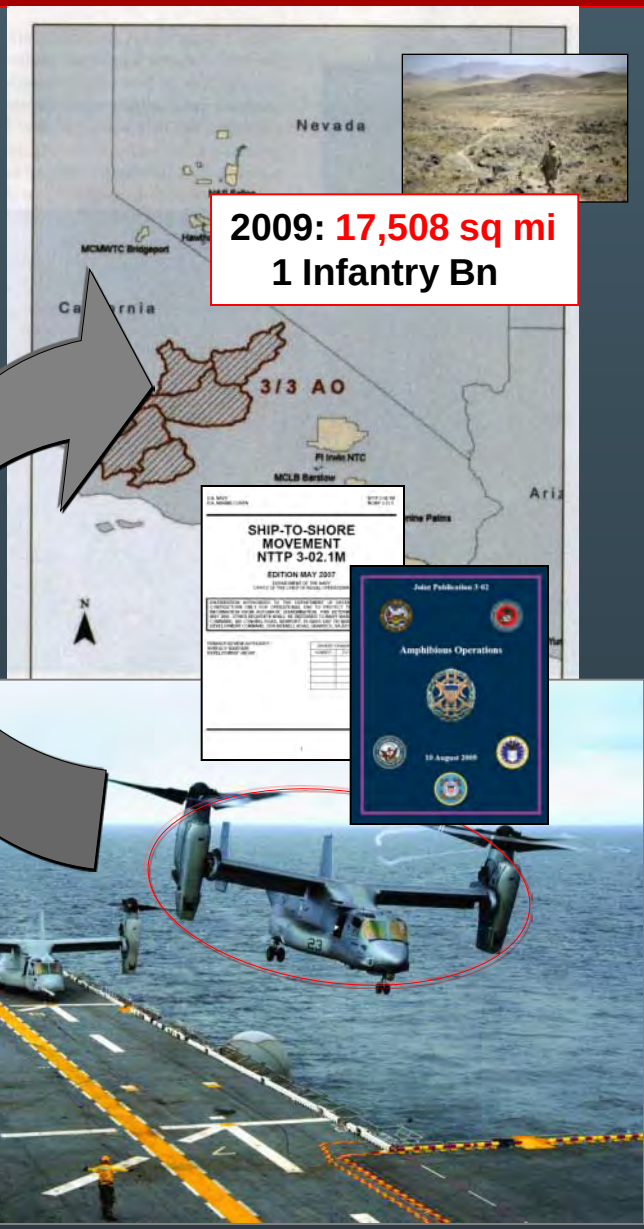
Our Challenge is not just the "Nature of the Enemy"



1862: 15 sq mi
8 corps/113,000



1945: 15 sq mi
3 USMC divisions
68,000 Marines/sailors
22,000 Japanese

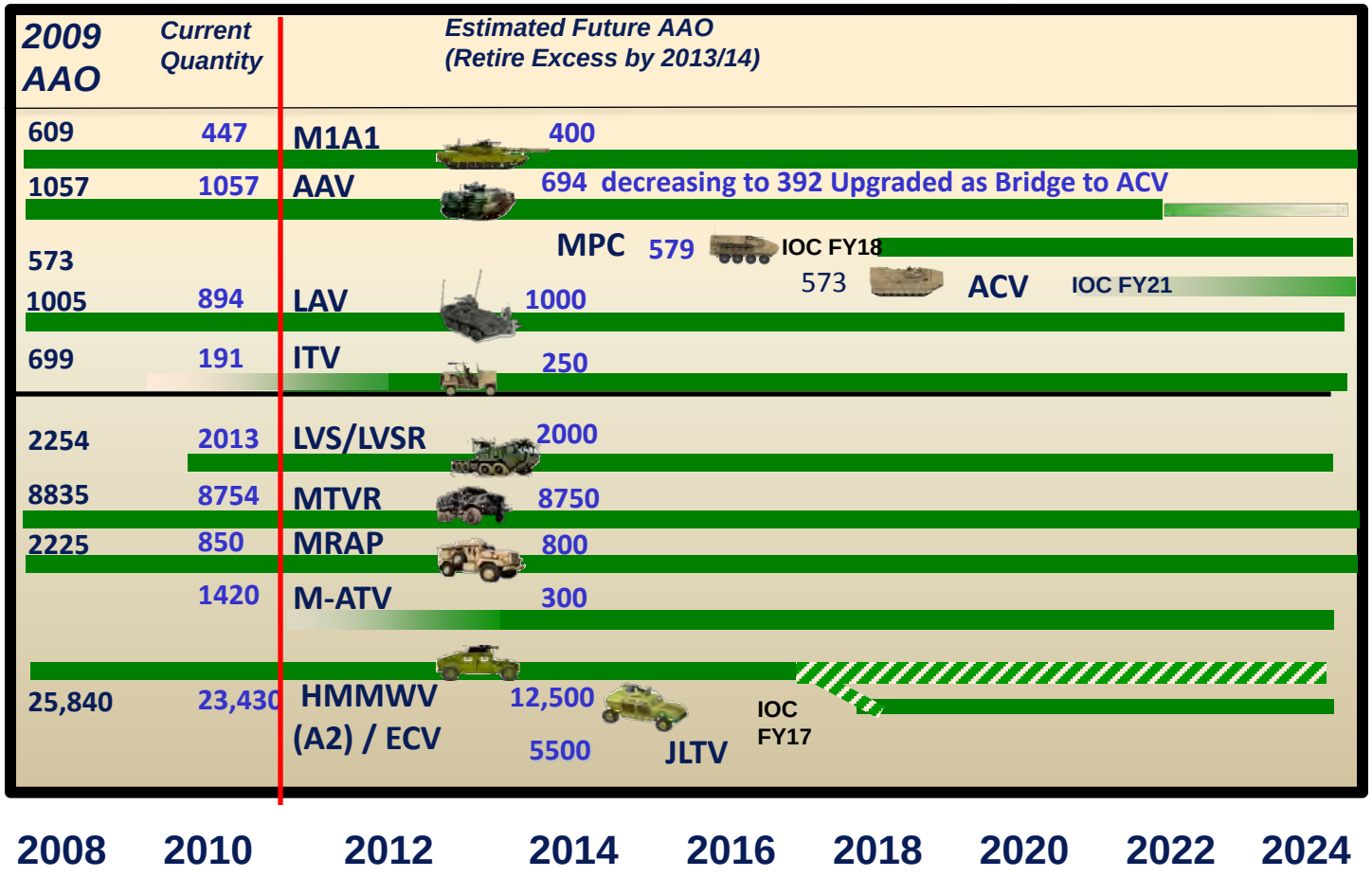


2009: 17,508 sq mi
1 Infantry Bn

There is a tyranny of distance and distribution. Our challenge is make it an advantage – not a liability.

"Recognize that small, distributed, agile general purpose tactical formations are a nightmare for enemy commanders."

2011 Ground Combat Tactical Vehicle Strategy



What an Amphibious Combat Vehicle Does

Critical Link – the ACV gains access from the sea for the joint force …..crosses the surf zone …gets off the beach ……to the objective

- **Rolls out of the well deck of a landing ship combat ready**
- **Transitions without pause at the water line ready to fight**
- **Breaches natural and man-made water & land obstacles**

✧ ***An Amphibious Combat Vehicle will successfully cross ground where other vehicles get stuck***

- **<u>Gets the landing force off the beach</u>**
- **Protects the force during offensive & defensive operations**

✧ ***An Amphibious Combat Vehicle protects combat ready cohesive units and delivers them into the fight without pause***

- **Expands a commanders maneuver options**
- **Maneuvers combat power in a single lift to defeat the enemy or deter aggression**

✧ ***An Amphibious Combat Vehicle delivers mass and lethality in the attack …reduces the risk by quick build-up of force during a lodgment ashore***

- **Carries the supplies and gear to sustain that combat unit through the assault**

Amphibious Combat Vehicle (ACV)

Description

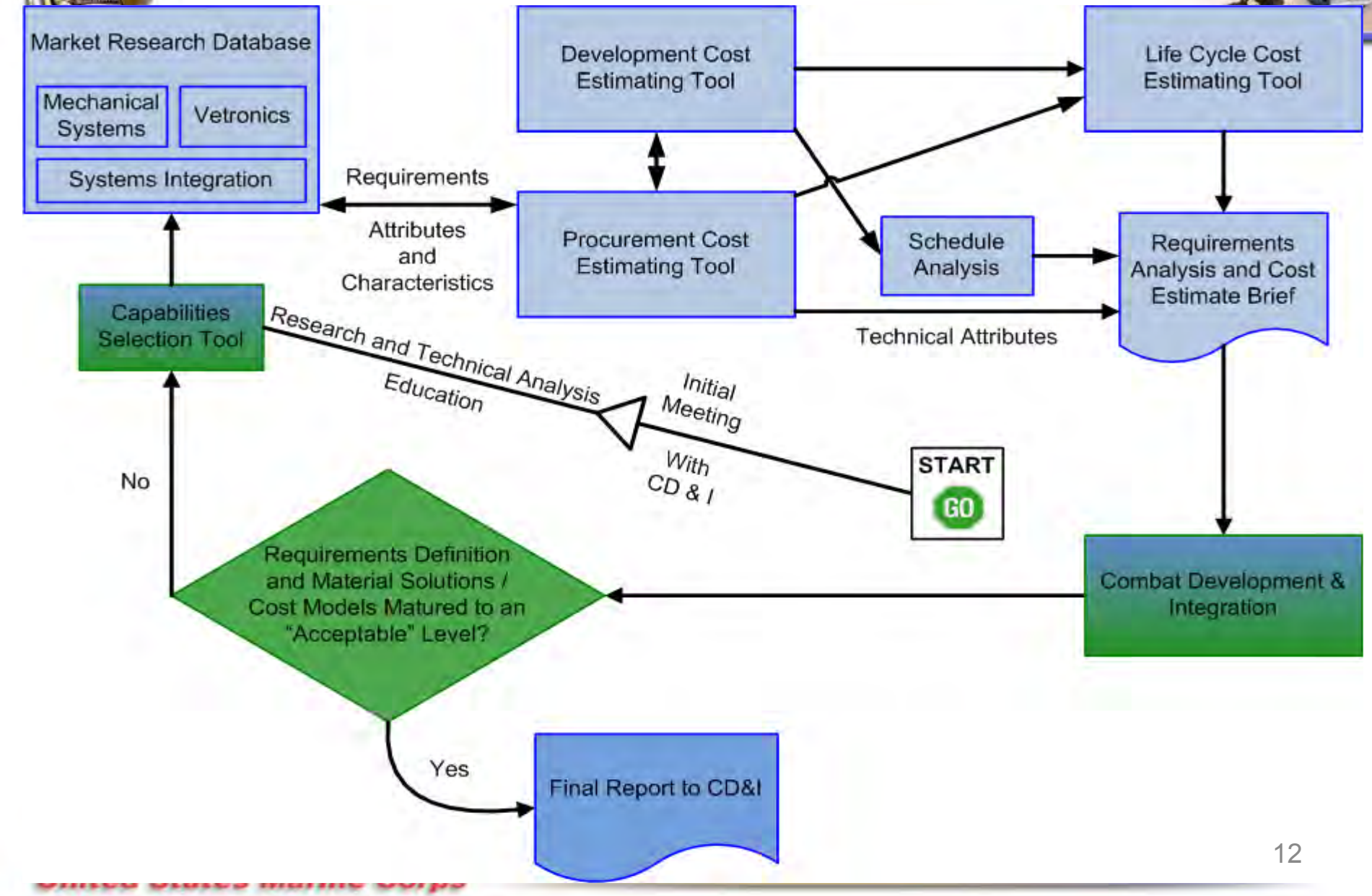
The Amphibious Combat Vehicle (ACV) replaces the canceled Expeditionary Fighting Vehicle (EFV) with personnel and C2 variants within the Family of Vehicles (FOV). The ACV will not have the high water speed/planing requirement.

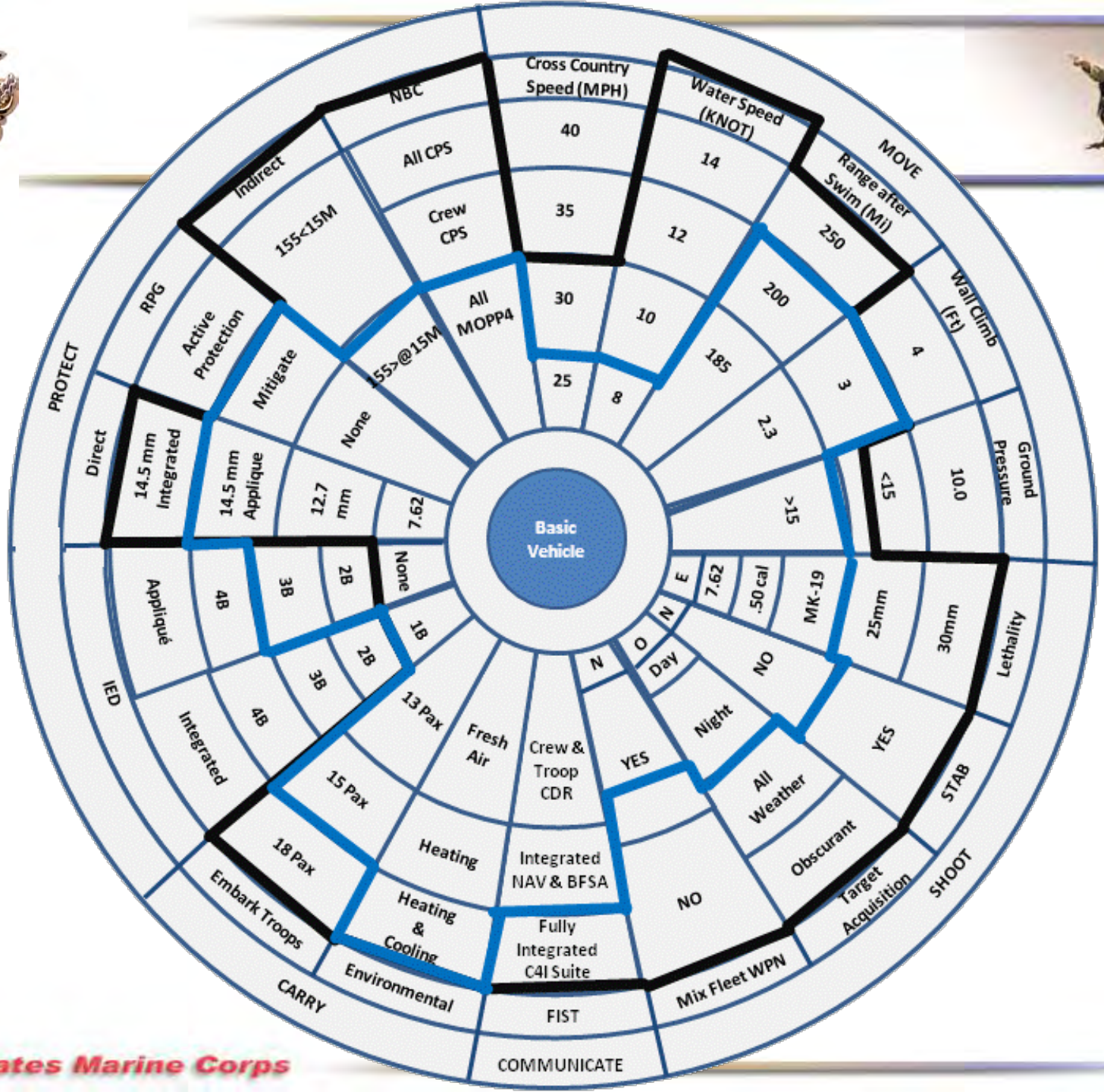
Mission: Amphibious Mobility/Firepower
Dimensions: H: ~130 in
W: ~130-146 in
L: ~320-370 in
Wt: ~50,000 – <80,000 lbs GVW
Weapon: TBD
Fire control: TBD
Capacity: 17 PAX + 3 Marine crew
Range: ~ 120 - 200 miles land, after a 12 nm swim
Speed: ~ 45 mph land, ~ 8 kts sea

Acq Status: Pre MS A
Acq Obj: TBD
IOC/FOC: TBD
Approx Unit Cost: TBD

Modernized the Assault Amphibian Battalion.

Systems Engineering OPT Process





United States Marine Corps

LAV & MPC

LAV – in the Light Armored Reconnaissance Battalion.

- Mission – To conduct reconnaissance, security, and economy-of-force operations, limited offensive or defensive operations that exploit the unit's mobility and firepower.
  - **Conduct Reconnaissance for GCE or MAGTF commander in the close and deep battle space**
  - **Conduct security operations to protect the GCE or MAGTF**
  - **Win the counter-reconnaissance fight**
  - **Exploit opportunities with long range firepower and mobility**
- 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.

- Mission – To provide armor-protected mobility for infantry battalion maneuver task forces. Two MPC lift a reinforced rifle squad.
- The MPC program balances vehicle performance, protection, and payload attributes.

Joint Light Tactical Vehicle (JLTV)

Mission: Light Combat mission roles and fwd Cmd
Dimensions: H: ~85 in operating ht (reducible to 76 in)
W: ~96 in
L: ~207 in
GVW: below 20k lbs

Weapons: .50cal/Mk19, TOW, Remote weapon

Expeditionary: CH53, CH47, Amphib and MPF compatible

Speed: 70 mph, 45 mph on 5% grade

Range: 300 miles

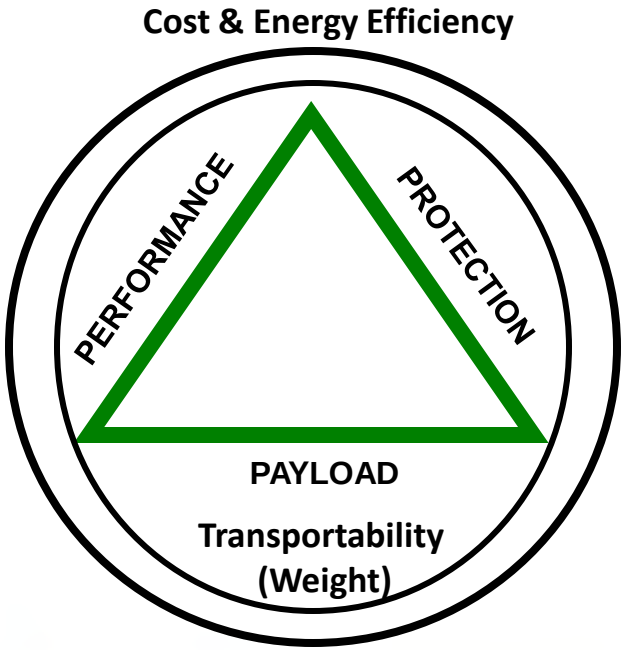
Acq Status: MS B 2012
Acq Obj: 5,500 (Increment 1)
IOC/FOC: 2017/2022
Approx Unit Cost: $360K

Variants:
- Weapons carrier
- Gen Purpose
- TOW carrier
- Utility
- Fwd C2

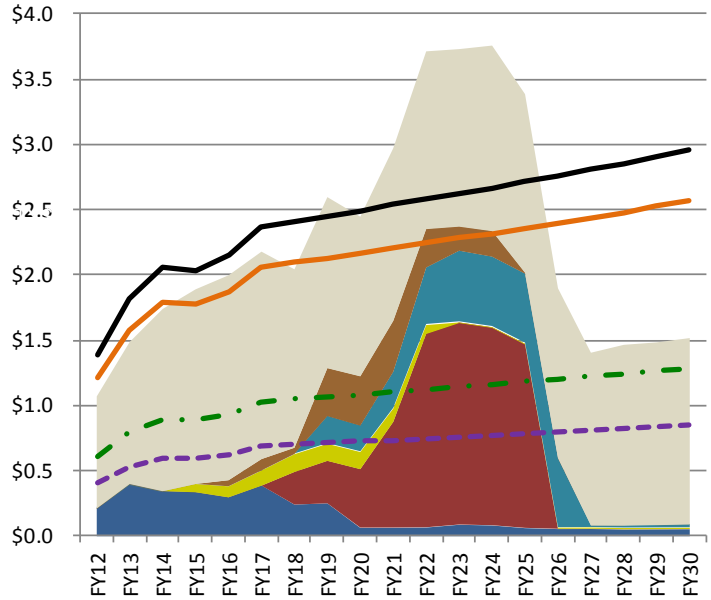
Affordability and the Iron Triangle

Cost further constrains the Iron Triangle:

Field an *affordable* fleet of ground combat and tactical vehicles that provide required capabilities and adequate capacity to meet the operational demands of the expeditionary MAGTF.



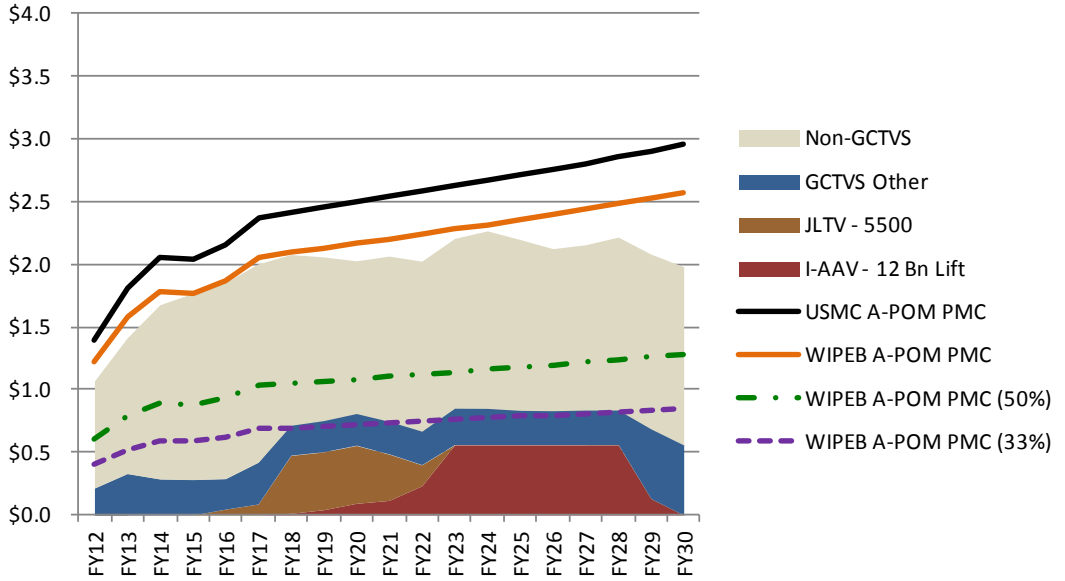
Managing Affordability



8 Bn Lift via ACV / 4 Bn Lift via MPC

- Non-GCTVS (NCB-13)
- JLTV - 5500
- MPC - 4 Bn Lift
- AAV - Bridge to ACV
- ACV - 8 Bn Lift
- GCTVS Other
- USMC A-POM PMC
- WIPEB A-POM PMC
- WIPEB A-POM PMC 50%
- WIPEB A-POM PMC 33%

AOA Option



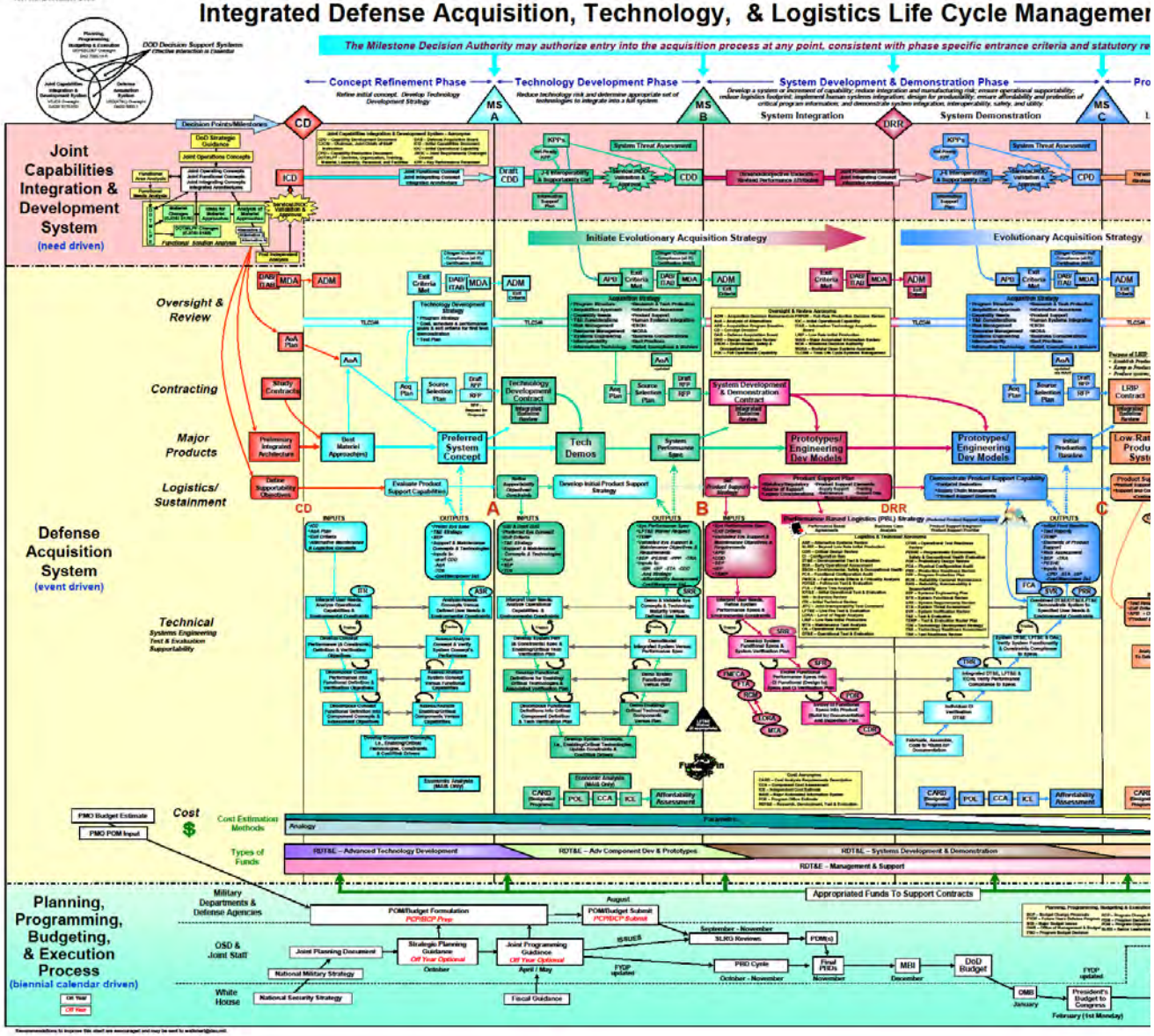
Acquisition Way Ahead

FY12	FY13	FY14	FY15	FY16	FY17	FY18
ACV Technology Demonstrator						
	AAV SLEP Design, Integration and Evaluation		**PRODUCTION**			
		MPC Competitive Vehicle Evaluation		**PRODUCTION**		
			ACV Competitive Design, Integration & Evaluation			**PROD**

Development Plan Informed by Industry

ver. 5.1, December 2004

Integrated Defense Acquisition, Technology, & Logistics Life Cycle Managemer




RISK

NDIA Combat Vehicle Conference

26 October 2011

William Sheehy
Colonel, Infantry
Project Manager

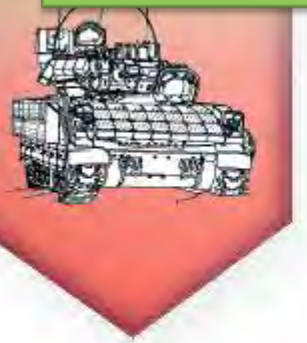
Varsity Combat Team

Current Situation

Issue: Current HBCT platforms are at or exceeding Space Weight and Power (SWaP) limitations while the Army continues to add / increase capabilities (CREW III, JTRS, MSS, etc.)

Bradley

Spec Weight: 36.3 tons
Power Available: 11200 watts



Current Weight: 39.25 tons
Power Deficit: - 5506 watts

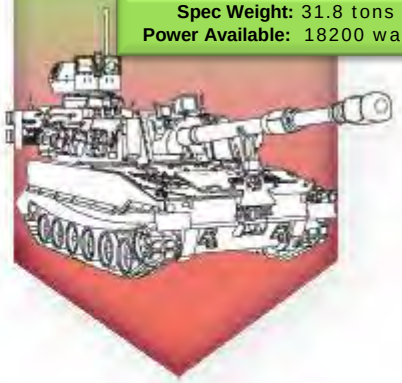
Abrams

Spec Weight: 70.0 tons
Turret Power Available: 8960 watts

Current Weight: 76.0 tons
Turret Power Deficit: - 2664 watts*
* With GMR

Paladin A6

Spec Weight: 31.8 tons
Power Available: 18200 watts



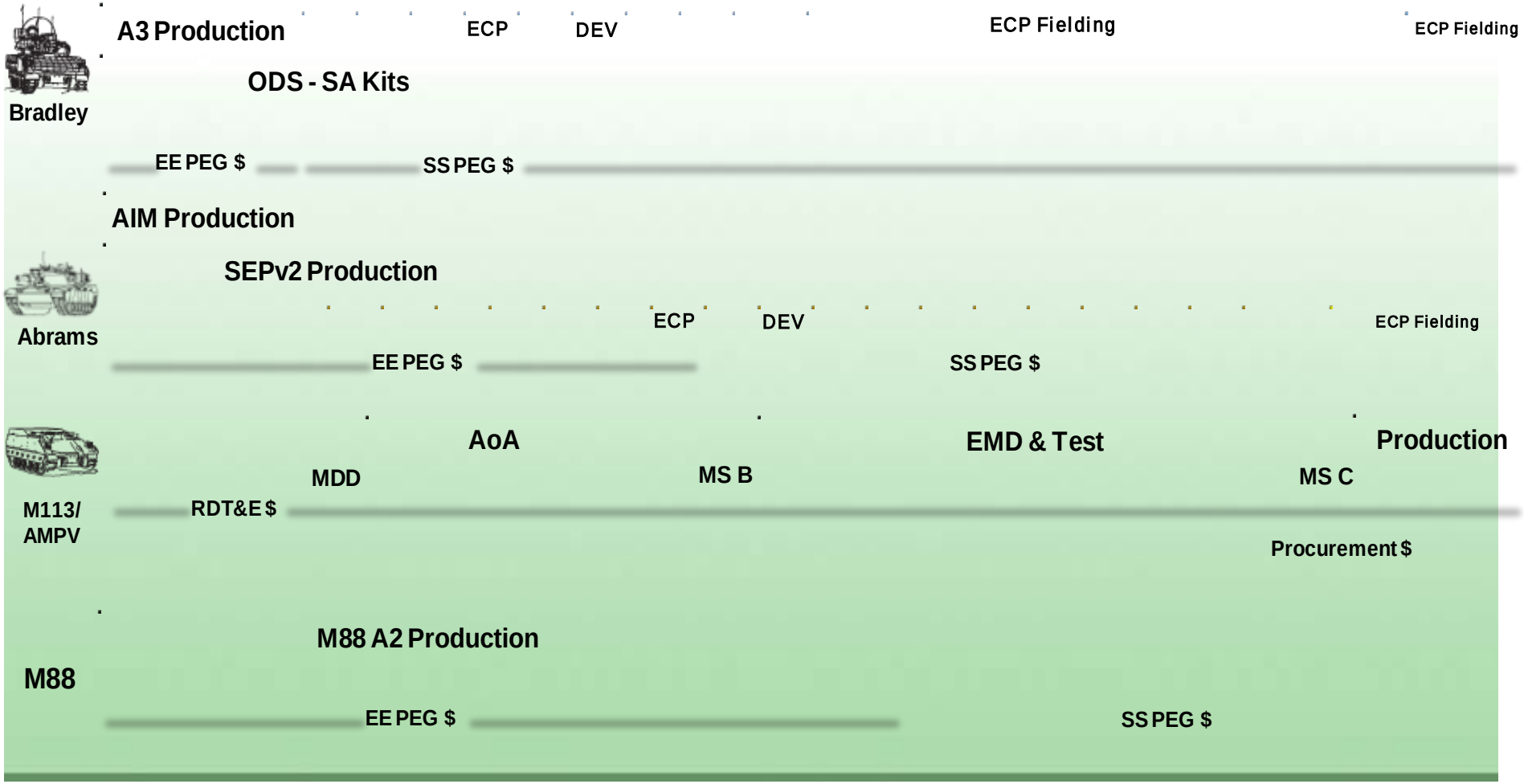
Current Weight: 33.1 tons
Power Deficit: - 4098 watts

M113
Terminated 2007

Combat Vehicle Portfolio Modernization Concept of the Operation

- The Army will execute a two-phased capabilities enhancement initiative across the Combat Vehicle Fleet.
  - Phase I ECP (Near Term): ASARC approved 8 June 2011
    - Abrams and Bradley programs will execute a series of Engineering Change Proposals (ECPs) reestablishing Space, Weight, Power and Cooling (SWAP-C) to facilitate integration of technologies being developed under existing Programs of Record (POR) (PEO/Army Decision).
    - Proposed ECPs will restore lost capability, not to exceed operational envelopes outlined in current requirement documents.
  - Phase II Modernization (Long Term):
    - Combat Vehicle MDD Canceled in Aug 2011. VCSA directed Abrams & Bradley not to execute MS programs. Look to expand ECP efforts.
    - Cost Benefit Analysis needed to determine which technologies to propose additional ECP efforts.
    - GCV enters the Technology Development phase (not included in this briefing).
    - AMPV will be a MS program. Awaiting AoA study guidance approval IOT execute MDD.

Execution



Focus Area

1) **Space Weight and Power (SWaP):**
   - **Must demonstrate how you make the system better by reducing the SWaP burden while adding capability**

2) **Commonality:**
   - **Commonality can be achieved at the circuit level or the component level**
   - **Not all "commonality" is good: must provide cost savings**

3) **Schedule:**
   - **Time is critical, won't be able to do everything**

4) **Cost:**
   - **"Zero Sum", cost growth in an area will result in reductions in another**

Phase I ECP Technologies

GAP: Network Enabled

Network Compatibility
- Joint Tactical Radio System – Handheld/Manpack/Small Form Fit (JTRS HMS)
- Joint Battle Command – Platform (Block Upgrade)

Power Generation/Distribution
- Battery Monitoring System
- 1000A Alternator
- Slip Ring

Line Replaceable Modules (LRM)
- Improved Commander's Display Unit
- Improved Commander's Electronics Unit
- Improved Hull Mission Processor Unit
- Improved Turret Mission Processor Unit
- Improved Driver's Integrated Display
- Improved Gunner's Control Display Panel
- Analog Input Module
- Improved Fire Control Electronic Unit

GAP: Lethality
Ammunition Data Link

GAP: Protection
Integration Kit for Counter Radio-Controlled IED Electronic Warfare (CREW/Duke 3)

Armor Upgrade

GAP: Sustainment
Auxiliary Power Unit (APU)

Phase I ECP Technologies

- Integration Ready (ECP1)
- Integration Ready (ECP2)

Power Train
- 675 HP Power Pack Upgrade
- 800 HP Transmission Efficiencies
- Cooling System Modification

Electrical System (low)
- Electrical Power Upgrade (600 Amp generator)
- High Speed Slip Ring Upgrade
- 1 G Ethernet Switch
- VHMS, Phase I
- Battery Management
- Begins VICTORY architecture compliance

Suspension &Track
- Extended Life Track
- Heavy Weight Torsion Bars
- Dampers and Road Arms

Enabled Capabilities
- FBCB2, JBC-P
- JTRS
- CREW v3
- Embedded Training
- Gun Shot Detection

Situational Awareness
- Improved FBCB2 Integration
- Common Intelligent Display

Addresses some capability gaps and Army inbound technologies.

Network Compatibility

- **Description of Technology**
  - Integration of the Government Furnished Equipment (GFE) JTRS Handheld, Manpack, and Small Form Fit (HMS) radio and Joint Battle Command – Platform (JBC-P)
  - JTRS-HMS replaces the Single Channel Ground and Airborne Radio System (SINCGARS) and Enhanced Position Location Reporting System (EPLRS) capabilities
  - JBC-P is the next iteration of the FBCB2 program. It is a joint, digital, family of systems that provides integrated, on-the-move, timely, relevant C2 & SA information to tactical combat, combat support and combat service support commanders, leaders, and key C2 nodes

- **Description of Capability**
  - Maintains the ability to disseminate critical information
  - Supports the need to establish network readiness and maintain Battle Command and Communications interoperability with future Brigade Combat Teams (BCT)
  - JTRS-HMS offers a 2 channel software defined radio that supports both legacy (SINCGARS) and future Soldier Radio Waveform (SRM), and Mobile User Objective System (MUOS) communications waveforms
  - JBC-P provides command and control at the platform level across the Services enabling joint situational understanding and battle space awareness. It provides Joint interoperability between Service and SOF platforms operating in the Joint Operations Area
  - JBC-P includes Unified Battle Command (UBC) identified upgrades including Chat, Email, Low Bandwidth Imagery, and full NetOps and provides the ability to share imagery data and incorporates Integrated Tactical Ground Reporting (TiGR) capability

Power Generation & Distribution

- **Description of Technology**
  - Include the Improved Amperage Alternator, Slip Ring, Hull Power Distribution Unit (HPDU)/Remote Switching Modules (RSMs), and the Battery Monitoring System (BMS)

- **Description of Capability**
  - Addresses the power demand growth potential and the need for dissemination of critical information
  - The modified Slip Ring will have the capability to pass increased radio frequency (RF) and power to the turret
  - Due to the changes to the alternator and the slip ring, upgrades to the HPDU and RSMs are also required
  - An increase in vehicle power generation with the Improved Amperage Alternator and improved power distribution with the modified Slip Ring is needed because there is no power margin remaining in the turret of the Abrams or Bradley
  - The BMS is required for the user to know the current status of the batteries that are needed for starting and maintaining silent watch capabilities

Battery Monitoring System

- **Description of Technology**
  - Additional power generated will be distributed to the vehicle hull and turret to support the increased power demands from the implementation of increment 1 technologies
  - Provides all vital information on each battery and tell the user what maintenance or when replacement is recommended
  - Starts and helps maintain silent watch capabilities and supports power management of the system
- **Description of Capability**
  - Reduce SWaP (Space, Weight, and Power)
  - Regain interior volume for crew and equipment
  - Increased energy efficiency
  - Reduces O & S costs
  - Enables Commonality within the PEO GCS community
  - Leverage industry and other services specifications
  - Regain growth potential enabling all systems/sub-systems in the vehicle to operate simultaneously, without the need to prioritize and shut down systems/sub-systems

Line Replaceable Modules (LRM)
(Abrams is Lead)

- **Description of Technology**
  - Cards/Modules are packaged to allow static free handling in vehicle
  - Leverage industry standard for single board computers interfaces
  - Multiple SBC vendors make these products
  - Supports emerging VICTORY Architecture

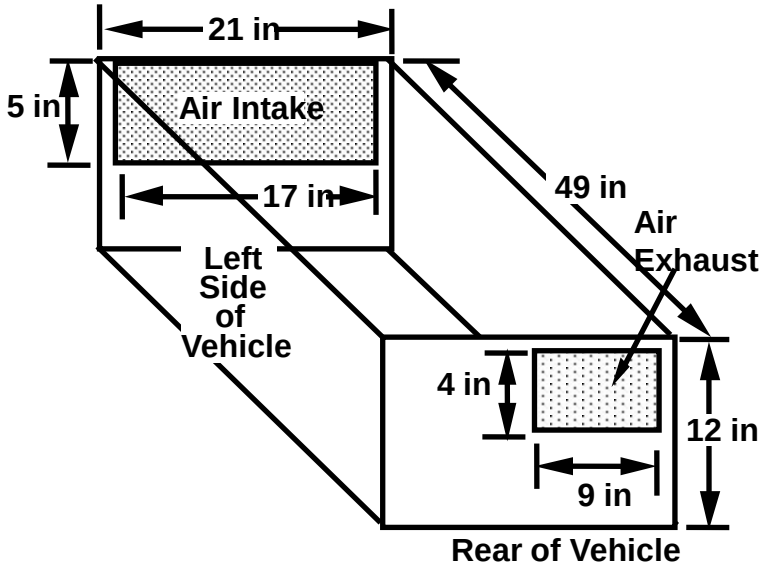
- **Description of Capability**
  - Reduce SWaP (Space, Weight, and Power)
  - Regain interior volume for crew and equipment
  - Increased energy efficiency
  - Reset Obsolescence Clock
  - Supports 2 level Maintenance
  - Now capable to replace cards in the field
  - Supports diagnostics to individual cards
  - Supports VHMS/CBM+
  - Reduces O & S costs
  - Leverage industry and other services specifications
  - Enables Commonality within the PEO GCS community

Acronym	M1A2 SEP v2 LRU Nomenclature
ICDU	Improved Commander's Display Unit
ICEU	Improved Commander's Electronics Unit
IHMPU	Improved Hull Mission Processor Unit
ITMPU	Improved Turret Mission Processor Unit
IDID	Improved Driver's Integrated Display
IGCDP	Improved Gunner's Control Display Panel
AIM	Analog Input Module
IFCEU	Improved Fire Control Electronic Unit

Auxiliary Power Unit (APU)
(Abrams Only)

- **Description of Technology**
  - A minimum of a 10kW auxiliary power generating unit using conventional mature technologies (diesel/turbine) to power on-board systems with a reduced noise signature
  - The unit will be integrated in the left sponson of the hull, and will be under armor
  - Mounting and interface including shock mounts, shall reside within the APU space claim
  - It will have full operator interface for operation control, monitoring critical parameters, and health and fault signals

- **Description of Capability**
  - Provides capability to operate on-board systems with a reduced probability of detection during main engine off, or silent watch operation
  - More cost effective and fuel efficient than the main engine to support operation of key systems for a duration of 12 hours (T) from a stationary tank, and provide power to start the vehicle
  - Extends current M1A2 SEP v2 capability to support power demands of future inbound technologies



Commonality

- **As part of the Heavy Brigade, PM Abrams and Bradley are focusing on areas of Commonality across the fleet.**
  - ECP effort will include
    - Scope to collaborate and foster commonality
    - Collaborative system engineering to look for common solutions
    - Commonality as a key criteria for trade studies

- **Developing areas of commonality are:**
  - HBCT Common Environmental Specification for design of new components
  - VICTORY 1.0 Standard Architecture Specification for new components

Phase I ECP Summary

- **The Abrams Tank and Bradley Fighting Vehicles will continue to evolve**
- **Current Bradley Fleet cannot host current in-bound technologies**
- **Upgrades/modifications will be applied through an ECP or multiple ECPs**
- **Requirements trace is to the current ORD**
  - Phase 1 technologies are confirmed
  - Analyzing potential Phase 2 technologies
- **Updates for the M1A1 Fleet being considered**
  - Ammunition Data Link
  - Network Upgrades

"Sustain the current fleet…. Modernize for the future."

Disclaimer

- **The Armored Multi-Purpose Vehicle (AMPV) Program is the proposed Army program for replacement of the M113 Family of Vehicles within the Heavy Brigade Combat Team.**
- **This program is still pending an FY12 Materiel Development Decision (MDD) that will define the program, to be followed by an Analysis of Alternatives (AoA) that will confirm the system or systems that will replace the M113.**
- **The Army will consider existing or programmed solutions which may include, but are not limited to, derivatives of the Bradley Fighting Vehicle, Stryker variants, Mine-Resistant Ambush Protected (MRAP) vehicles, variants of the Ground Combat Vehicle, or other systems.**
- **No activity to identify or select a systems contractor or contractors will begin until after the MDD decision is made and the AoA is complete.**

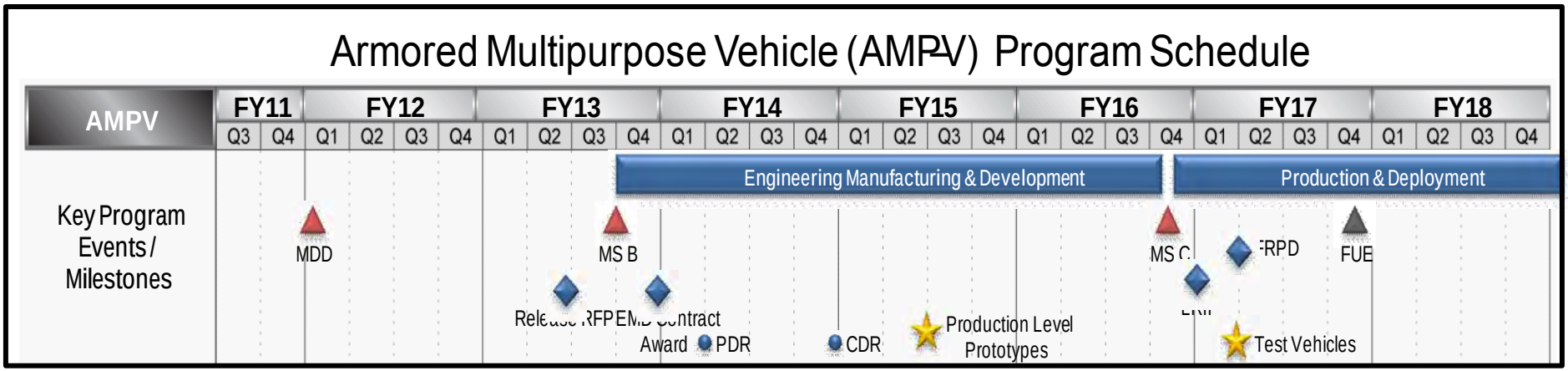
Mission Roles of the M113 FOV

AMPV focuses here

1. **Command and Control**
   - Maneuver
   - Fires
   - Engineer
2. **Medical**
   - Evacuation
   - Aid Stations
3. **Fire Support**
   - Mortar Carriers
   - Fire Direction Centers
4. **First Sergeant**
   - Primary Vehicle
5. **Mobility/Counter Mobility**
   - Sapper Companies
   - Mobility Augmentation Companies
   - Volcano
6. **CS/CSS**
   - Maintenance Vehicle
7. **Chemical**
   - Smoke Vehicle

AMPV Projected Schedule

assumes Bradley Derivatives



Bradley Derivatives Proposed Technologies

GAP: Protection

- **Existing Bradley Capabilities**
  - Belly Armor Kit
  - Reactive Armor Tile Provisioning
  - Bradley Urban Survivability Kit (includes mine/IED seating)
  - Drivers Vision Enhancement (part of CM/ED)
- Gunner protection kit
- CREW v3 A-kit
- Roof armor (former turret area)
- COTS Litter Kit and Medical MEP
- Environmental Cooling System (Medical variants)

GAP: Mobility

- **Use of Bradley A3 Hull configuration**
- **BFV A3 600hp powertrain**
- **Chassis Modernization w/ Embedded Diagnostics and DV**
- **BFV A3 Suspension and T157 Track**
- External Fuel Tanks
- TC Hatch

Red = Current Bradley

GAP: Network Enabled

- **Smart Display Unit/FBCB2 Display**
- **SINCGARS Radio A-kit integration**
- Provision for future C4ISR power requirements
- M1068 C2 communications/C4ISR A-kits

GAP: Lethality

- Flexible mounted crew-served Weapon
- M1064 Mortar Mission Equipment Package

TDP not 100% complete

MEP Definitions
(Draft – Pre-AoA)

- **General Purpose Vehicle will:**
  - Have a crew of 2 with up to 6 passengers
  - Integrate WIN-T

- **Command Vehicle will:**
  - Host common C4 Mission Equipment Packages (MEP) and Government Furnished Equipment (GFE) including shelter.
  - Provide for a minimum of two (2) workstations with an operator per workstation
  - Integrate SINCGARS, BFT2, WIN-T, JTRS GMR, JTRS HMS, MFCS, AFATDS, other ABCS systems, etc

MEP Definitions
(Draft – Pre-AoA)

- **Mortar Carrier Vehicle will:**
  - Accommodate a smoothbore 120mm Mortar system, which must be capable of firing: HE, illumination, IR illumination, smoke, precision munitions, and the Family of Extended Range Munitions (FERA).
  - Integrate the current M95 Mortar Fire Control System-mounted and carry current ground mounting and firing equipment as utilized on the M1064 Mortar Carrier
  - Accommodate four Soldiers

MEP Definitions
(Draft – Pre-AoA)

- **Medical Treatment and Medical Evacuation Vehicles will integrate:**
  - Litter lift system
  - Ambulatory seating
  - Mounting brackets for the Mission Equipment Package (MEP)
  - ECU and heating
  - Medical grade power for the MEP sets
  - Storage for medical items
  - Locked cabinets for controlled substances
  - IV holders
  - Lighting

Closing Remarks

- **Out years are lean - Cost & Schedule will be critical**
- **ECP efforts are not STS**
- **Ensure you know the vehicle requirements and specifications**

Questions?

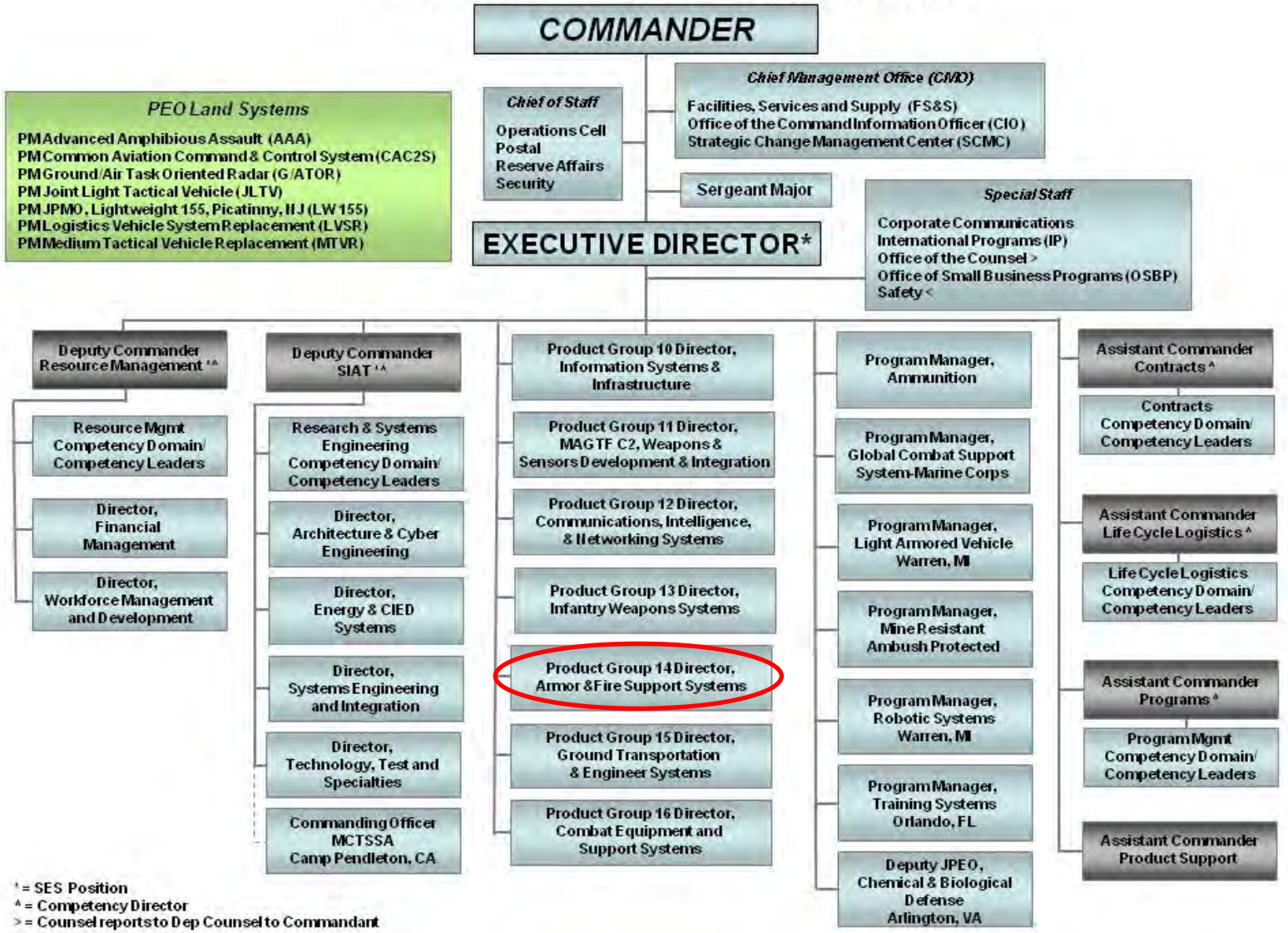
PM Tank Systems
PMM 142

LtCol J.E.Smith
25 Oct 2011

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.

MARCORSYSCOM ORGANIZATION



* = SES Position
^ = Competency Director
> = Counsel reports to Dep Counsel to Commandant
< = Safety reports to SIAT

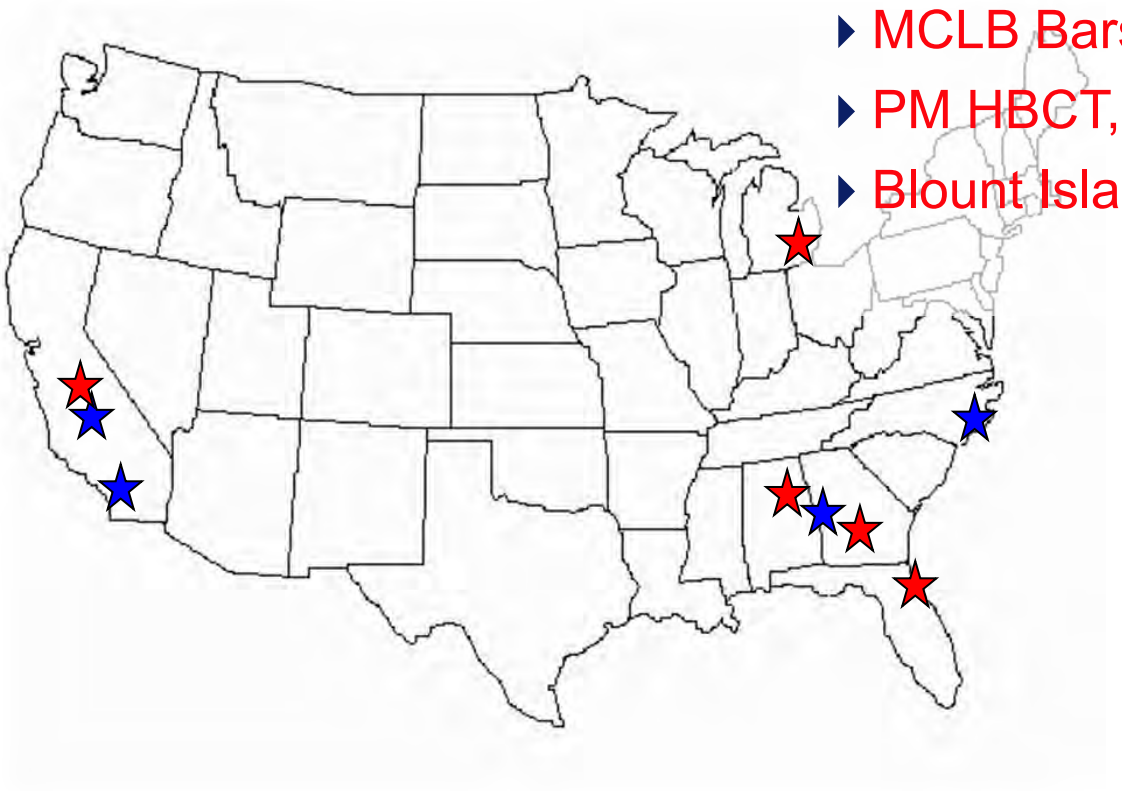
Customers

Customers

- 1st Tank Bn
- 2nd Tank Bn
- 4th Tank Bn
- Fort Benning

Principle Government Partners

- Anniston Army Depot
- MCLB Albany, Ga
- MCLB Barstow, Ca
- PM HBCT, TACOM
- Blount Island Command



Projects

- Tank:
  - Abrams Suspension Upgrade
  - Stabilized Commander's Weapon Station
  - Improved Loader's Weapon Station
- M88A2
  - Commander's Weapon Station
  - Automatic Fire Extinguishing System
  - Electronic Fuel Injection
  - Cold Start
- AVLB
  - Hydraulic/Electric Upgrade

…Future

- User's priorities*
  - C2 improvements
  - Improved Commander's Sensor Suite
  - Driver's station improvements
- Where we can use help
  - How can we be lighter?
  - How can we reduce expeditionary support requirements?
  - What opportunities are there to reduce operating costs?

* (currently undefined as a requirement)

Questions