RDECOM

TARDEC

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TARDEC

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TARDEC Update for TTCP

APRIL 2009

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Report Documentation Page

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Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

Briefing Purpose

- The purpose of this brief is to update The Technology Co-operation Program team on several fronts

TARDEC Organization

Chief Scientist	
Gorsich, Dr. David	4-7413
Senior Research Scientist	
Gerhart, Dr. Grant	4-8634
Executive Assistant	
Teceno, Mary Lou	4-8626

TARDEC Director	
Bochenek, Dr. Grace	4-6144
Executive Officer	
Ryans, Almena	4-6125
Executive Assistant	
Rosario, Ruth	4-6144

MILDEP	
LTC Andres Contreras	4-5059
Executive Assistant	
VACANT	
Quick Reaction Cell**	
Schehr, Steve – AD	4-5780
Operations Cell**	
Smith, Vicki – TL	

Strategic Transformation Cell**	
Gonda, Terry	925-2601
Lean Six Sigma Cell**	
Strategic Communications**	

* 120-Day Detail Positions

** Shown on another chart

*** Acting

Exec Dir of Development	
Mathes, Mr. Thom	4-5802
Force Projection Technology	
Balling, Fred	4-4100
Design & Rapid Prototyping Ctr	
Soltesz, Jim	4-6191
Director of NAC	
Skalny, Paul	4-6387
Director of Center Support	
DeVuono, Frank***	4-8589
Dir of Pgm Analy and Eval	
Misuraca, Tony***	4-7173
Business Manager	
Misuraca, Tony	4-7173
Plans & Programs Manager	
Sanders, Derhun*	4-7126

Exec Director of Research			
Rogers, Dr. Paul	4-6378		
Ground Veh Power & Mobility		Concepts, Analysis, Sys Sim & Integ (CASSI) Dir	
Coutteau, Chuck*	4-8237	Ciarelli, Ken*	4-5086
Survivability		Advanced Concepts	
Knott, Steve	4-6601	Iler, Carey	4-6073
Intelligent Ground Systems		Analytics AD	
Thomas, Dave	4-6160	Gorsich, Dr. David	4-7413
Joint Center for Robotics		Sys Demonstrators AD	
Overholt, Dr. Jim	4-8618	Loewen, George*	4-6150
Tech PM for Unmanned Ground Vehicles		HW & Man-in-loop Sim AD	
Ostrowski, Chris	3-2620	Brudnak, Dr. Mark*	4-7355
		HPC & Data Mgmt AD	
		Ciarelli, Ken*	4-5086

Exec Dir of Engineering			
Athnasios, Magid	4-7448		
Combat Vehicles		Director of Ground Vehicle Integration Center	
Bohdanowicz, Ed	4-5246	Brendle, Dr. Bruce	4-5798
VE/DMSMS & OSCR		SE & Integ Support to MRAP	
Gaereminck, Randal	4-8602	Richman, Todd – TL	4-6164
Tactical Vehicles & RAM		Systems Engineering Group	
Sturgeon, Ronald	4-6345	Andres, Ed – TL	4-6651
Product Lifecycle Data Mgmt		Engineering Business Office	
VACANT		Direct/Matrix Support to PMs	
Power & Materials		Next Gen Software	
Tomkiw, Marta	4-7455	Slominski, Mark	4-4260

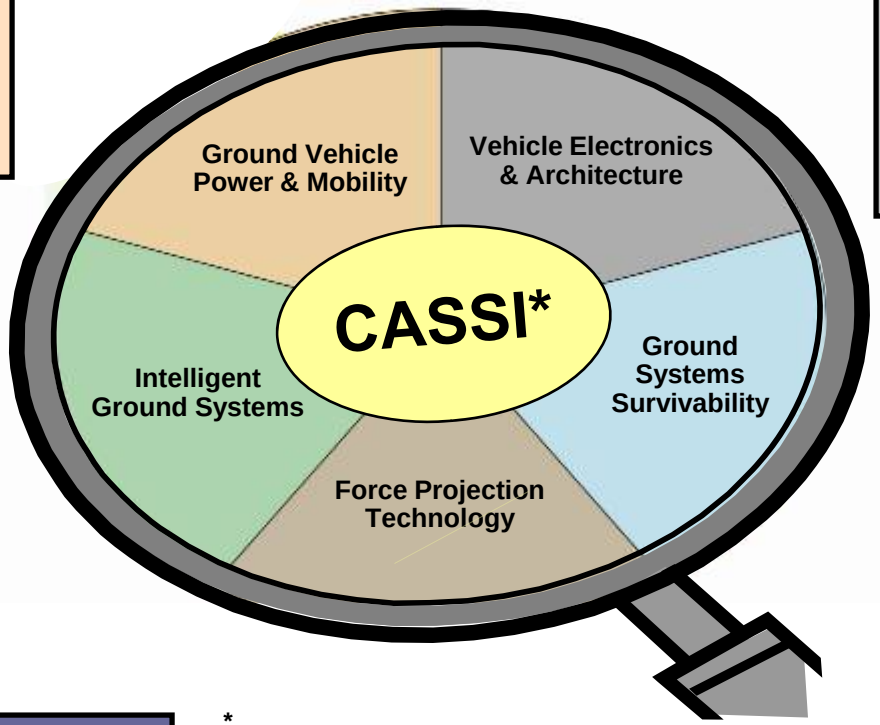
CASSI within TARDEC's RBG

Ground Vehicle Power & Mobility

- Hybrid Electric
- Pulse Power
- Engines
- Fuel Cells
- Suspension
- Tracks

Vehicle Electronics & Architecture

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



Intelligent Ground Systems

- Robotic Systems Technology
- Human-Robot Interaction
- Crew Interface and Automation
- Robotic Follower ATD

Ground System Survivability

- Active Defense
- Signature Management
- Laser Vision Protection
- Ballistic Protection
- Crew Survivability

Force Projection Technology

- Water Generation & Purification
- Petroleum, Oils & Lubricants
- Mechanical Countermine
- Combat Engineering/Bridging
- Gap Crossing
- Future Truck System

*

Concepts, Analysis, System Simulation & Integration

- Requirements Capture, Concept Development, Program Formulation
- Dynamic/Structural Performance, Mathematical Modeling, Data Analysis
- Physical Validation, Systems-Level Validation
- High Power Computing, Product & Program Data Management
- Integrated System-Level Demonstrators

RBG = Research Business Group

Concepts / Analysis / System Simulation / Integration (CASSI) Mission & Objectives

Mission:

- Provide Rapid Assessment and Integration Services to both Technology and System/Platform Development Programs
  - Throughout the Lifecycle (Requirements – Technology Insertion – Demo – Production – Sustainment – Product Improvement Projects)
  - Consider War fighter, System, and System-of-Systems Contexts

Objectives:

- Provide (Systems/System of Systems) Perspective to Combat Developer, PM and Tech Developer on Requirements, Tradeoffs & Integration
- Provide SWAP, Performance, Operational, Cost, & Sustainment Impacts
- Provide and Share Configuration Managed Data on Technologies, Systems, M&S and related programs/processes
- Explore Multiple Options and Trades Rapidly

Methods:

- Develop Vehicle Concepts & Perform Concept Analysis and Trade Studies
- Perform System Assessments using Physics-based, Statistical-based, HW/Man-in-the-Loop, and Distributed Simulation Tools
- Develop Integrated System Level Demonstrators

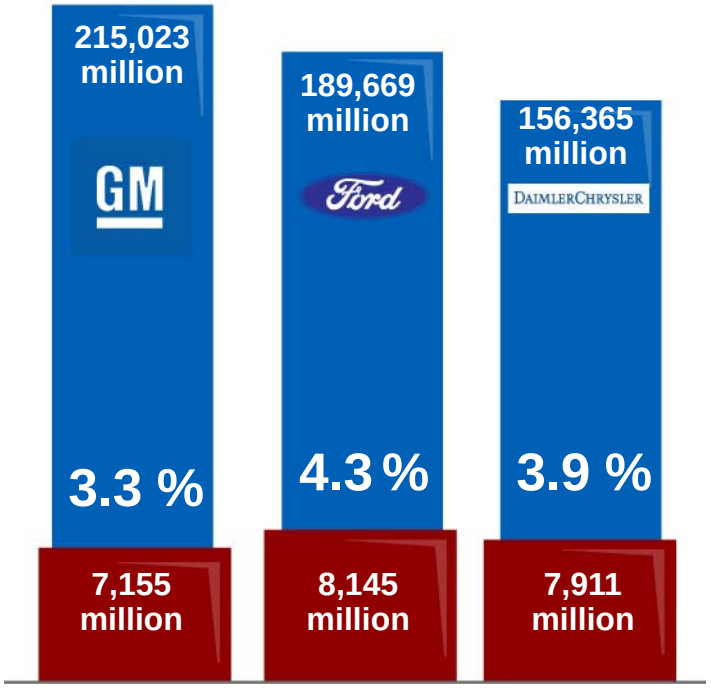
Insight into Army Ground Vehicle Business

TACOM LCMC (2007)*

*Based on 2007 TACOM APBI

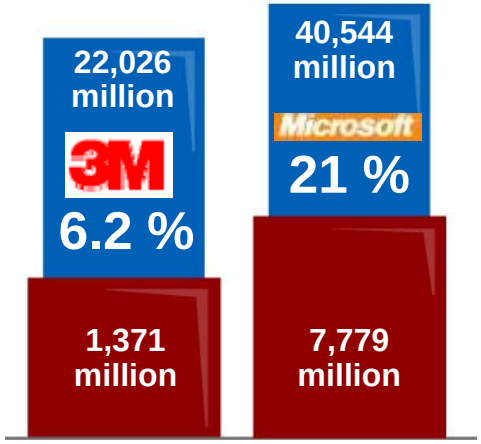
US AUTOMOTIVE INDUSTRY

(2007 Dollars based on 2004 figures at a rate of inflation of 3.25%)**



Other US INDUSTRY

(2007 Dollars based on 2004 figures at a rate of inflation of 3.25%)**



**Based on 2004 Annual Reports

Ground Vehicle Update

Predecessor Vehicle: Armor Protected MXT Produced under contract to the US Army's TARDEC: National Automotive Center

- Work has started on a fleet of over 200 new 'go anywhere' vehicles which will greatly improve the protection of British troops in Afghanistan.
- Navistar Defense is building and supporting the new Husky vehicle which has been designed for a range of missions including transporting food, water and ammunition, and acting as a command vehicle at headquarters.
- Equipped with a machine gun, the new protected support vehicle is designed to provide commanders with a highly mobile and flexible load-carrying vehicle for the troops on operations.
- The vehicle is based on the Navistar MXT-MV platform, which was developed in partnership with the US Army's TARDEC-NAC.

The Husky will provide a robust and highly mobile protected support vehicle for operations

Future Combat Systems Update

PROGRAM MANAGER
FCS
BRIGADE COMBAT TEAM
One Team-The Army/Defense/Industry

Future Combat Systems Overview

The Future Combat Systems (FCS) is the cornerstone of Army Modernization. FCS is the Army's promise to provide Soldiers the best equipment and technology available as soon as practical. FCS is not just a technology development program-it is the development of new Brigade Combat Teams-these new brigades, with more infantry, better equipment, unmatched situational awareness and communications allowing complete domination in asymmetric ground warfare while allowing the Army to build a force that can sustain itself in remote areas. It can also be adaptable to civil support, such as disaster relief. FCS will provide the Army and the joint force with unprecedented capability to see the enemy, engage the enemy, and defeat the enemy on today's and tomorrow's battlefield.

Joint Light Tactical Vehicles

Overview

LTC Wolfgang Petermann
Product Manager
JLTV, US Army
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(586) 239-2302

LtCol Ruben Garza
Program Manager
JLTV, US Marine Corps
ruben.garza@usmc.mil
(703) 432-5385

Joint Light Tactical Vehicles

MISSION:

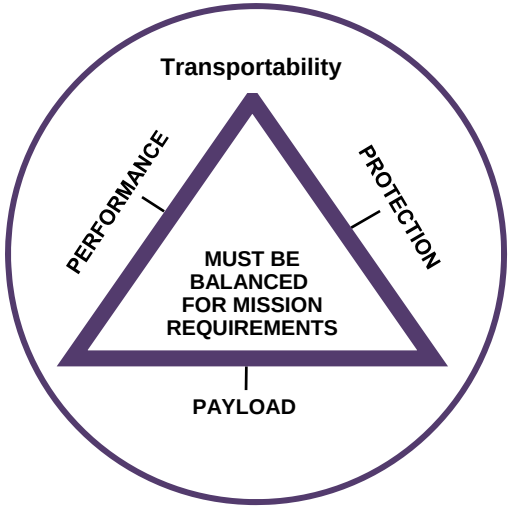
Jointly develop, produce, field and sustain safe, reliable, suitable and effective family of Joint Light Tactical Vehicles

VISION:

JLTV – Providing our Joint Warfighter with the very best in light tactical vehicle payload, protection and performance

JLTV Capability Discussion

Capability gaps within existing fleet are the result of an imbalance in protection, payload, and performance within a transportable vehicle



- Current fleet mix:
  - Protection: fixed protection in light vehicles
    - Require inherent and supplemental armor, scalable to mission
  - Payload: supplemental armor reduces useable payload
    - Require a design that supports armor, warriors, mission equip, C4, cargo
  - Performance: supplemental armor degrades all elements
    - Require a design that supports mobility, reliability & maintainability at gross vehicle weight & transport at essential combat configuration
  - Transportability: current platforms lack armor design flexibility to allow full range of transportability
    - Require a design which enables Rotary and Fixed Wing Air, Sea, Overland transport

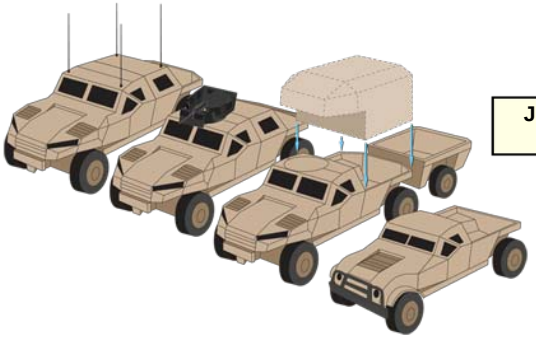
The JLTV vehicles *YOU* will build will address this imbalance & meet DoD goals for costs & long-term sustainability

Government Funded LTV Development

2005

2005

2007



JLTV Tech Demo: CAD models of JLTV FoV

Sources: JLTV CDD, CONOPS, & OMS/MP

JLTV Concept of Operations Summary

JLTV to provide scalable C4I and adaptable levels of protected mobility to Fire Teams and Combat Support teams.

Adaptable:
- Varying levels of protection in response to mission threat
- Expeditionary vehicle family
- Over full range of operations / conditions

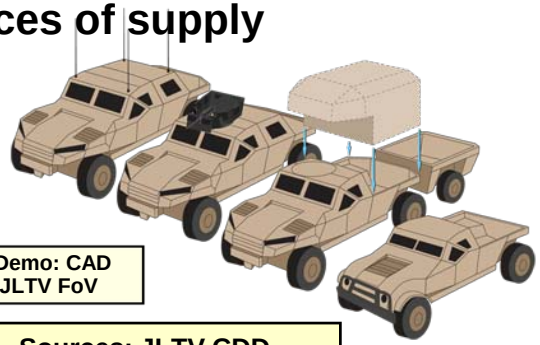
Network-Ready / Interoperable
- Space, weight, power claims for C4I systems

Resilient:
- Designed to enter harms way & return forces safely
- Adapts light fleet to the IED / Counter Insurgency paradigm
- Retains Major Combat Operations capability

Increases maneuver capacity:
- Provides protected mobility on the modern battlefield

Protected Mobility:
- Exceeds current TWV payload & tactical mobility
- Increase protection (especially EFP & IED) through scalable armor
- Returns payload currently traded for armor

Increased commonality:
- JLTV to be designed for commonality beyond major components, to include repair parts, tools, training, system design, maintenance procedures and sources of supply



JLTV Tech Demo: CAD models of JLTV FoV

Sources: JLTV CDD, CONOPS, & OMS/MP

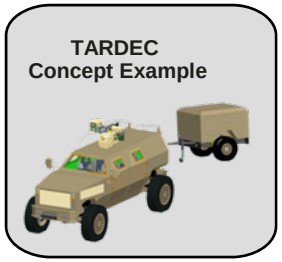
JLTV Balanced Solution

PAYLOAD CATEGORY A

Payload: 3,500
Performance: Exceed HMMWV
Transport: 1x EAT* CH 47/53
2x IAT** C130

Sub-Configurations

- General Purpose Mobility (4 Seat) - Army/USMC



* EAT: External Air Transport
** IAT: Internal Air Transport

Program focus during Technology Development Phase is on these key configurations build key vehicles, 1 A, 2 B, 1 C

PAYLOAD CATEGORY B

Payload: 4000/ 4500 lbs
Performance: Exceed HMMWV
Transport: 1x EAT* CH 47/53
1x IAT** C130

Sub-Configurations

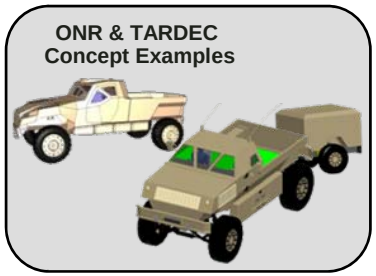
- Infantry Carrier, Fire Team (6 Seat)-Army/USMC
- Reconnaissance (6 Seat) - Army
- C2OTM (4 Seat) – Army/USMC
- Heavy Guns Carrier (MP, Patrol, Escort) (4 Seat+ Gunner)- Army/USMC
- ITAS (TOW) Carrier (4 Seat) Army/USMC
- Utility (2 Seat) – USMC
- Ambulance (3 Seat+2 Litters) Army/USMC

PAYLOAD CATEGORY C

Payload: 5,100 lbs
Performance: Exceed HMMWV
Transport: 1x EAT* CH 47/53
1x IAT** C130

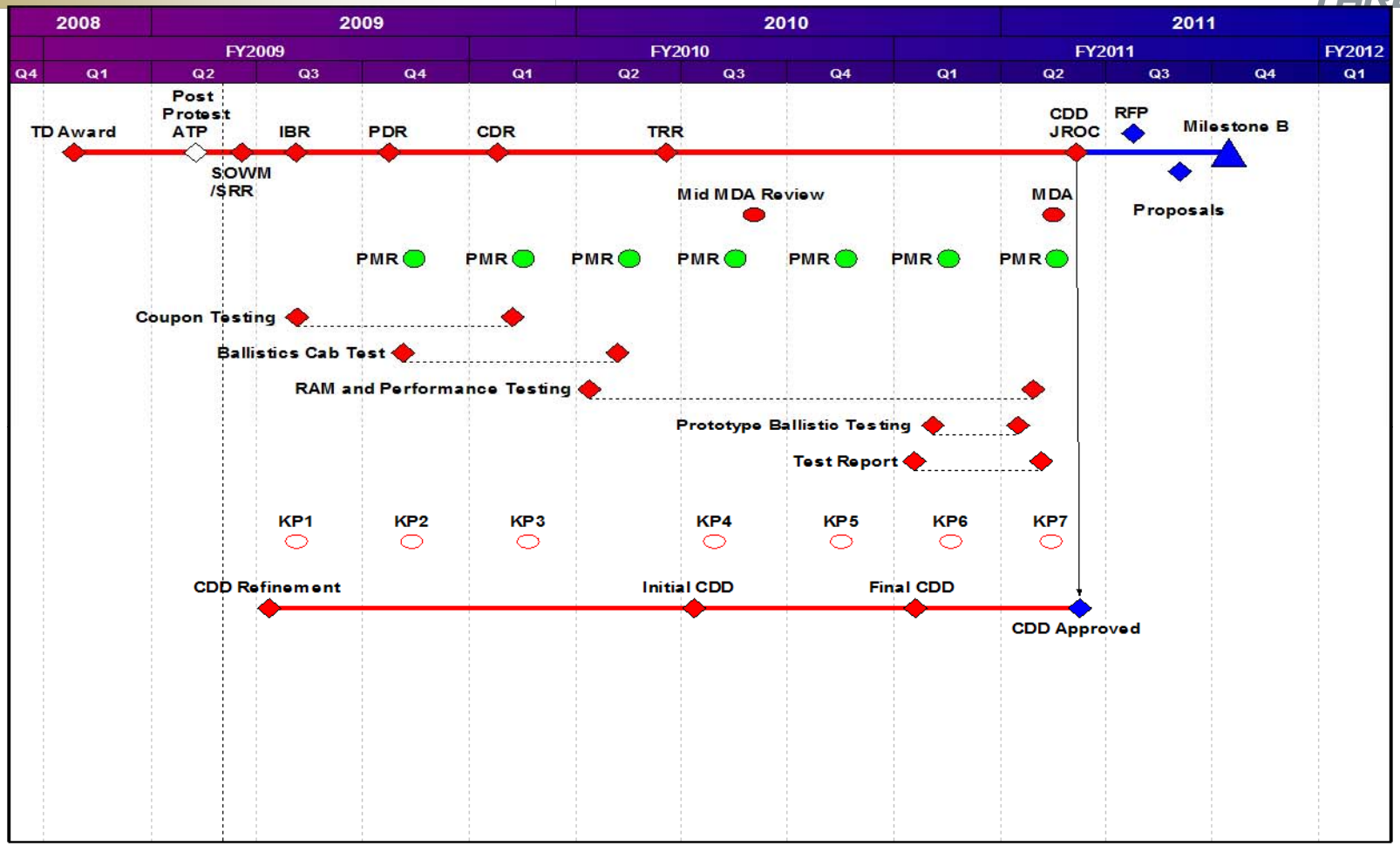
Sub-Configurations

- Shelter Carrier / Utility /Prime Mover (2 Seat) - Army/USMC
- Ambulance (3 seat + 4 Litter) - Army/USMC



Trailers for each payload category to have equivalent payload and mobility to support prime movers.

JLTV Tech Demo - Schedule



TD Program Schedule v1.0
Dated: 3 March 09

- Continue to monitor funding situation and schedule impact
- KP Reviews are designed to inform the CDD and PD requirements by looking at requirements achievability across all 3 KTRs
  - Organized thru Requirements IPT and led by Combat Developer

JLTV TD Exit Criteria

- Approval of the appropriate capabilities development document (CDD or CPD), supported by analysis from TD work
- Demonstration of an ability to achieve TRL 6 (minimum) in an integrated system with a focus on:
  - Protection
  - Transportability
  - Reliability
  - Producibilty
- An assessment of commonality across the JLTV FoV
- An assessment of the technical risks relevant to entering initial production will to lay a foundation for the Manufacturing Assessment done during EMD.

Light & Medium Armored Vehicles

2-6 Feb 09

COL Kevin Peterson
Principal Deputy Program Manager
Joint MRAP Vehicle Program

MRAP Variant Overview

Manufacturer

Navistar Defense

MaxxPro

MaxxPro MEAP Ready

MaxxPro Plus

MaxxPro Dash

BAE

CAIMAN CAT I (BAE-TVS)

CAIMAN PLUS

BAE CAT II RG 33L

BAE CAT II LRIP 10

Force Protection

FP COUGAR CAT I (FPII CAT I)

FP COUGAR CAT II (FPII CAT II)

General Dynamics

GDLS RG31 (MK5) • CAT I

GDLS RG31 (MK5) EM • CAT I

MRAP International Programs

- Nine separate Foreign Military Sales Cases open with Four different Coalition Partners
- Eight different Variants procured to date
- Two models custom designed to meet Country unique requirements
- 10 Additional Coalition Force / Country inquiries with 2 potential procurements efforts pending
- MATV will be added to procurable MRAP line this FY.

MRAP Recovery Vehicle

- Approved Army ONS for 134 vehicles to recover MRAP

- Addendum to MRAP I Performance Specification being developed to address recovery capabilities.

- Acquisition Strategy similar to MRAP Armored Utility Vehicle may be pursued.

- Survivability requirements similar to that of MRAP I

- Draft Characteristics:
  - Flat Tow & Lift Tow MRAPs
  - 30 Ton Crane Capacity
  - 40 Ton Main Recovery Winch Capacity

Technology Insertion into Future MRAP Production/Retrofit

- Technology Insertion
  - Rear-View Camera
  - Long Range Advanced Scout Surveillance Sensor (LRAS3)
  - CROWS II
  - Boomerang
  - VanGuard
  - TOW Integrated Target Acquisition Sensor (ITAS)
  - Additional Exterior Lighting
  - Mounted Battle Command on the Move (MBCOTM)
  - DVE Forward Assisted Detection System (FADS)

CROWS II

LRAS3

Boomerang

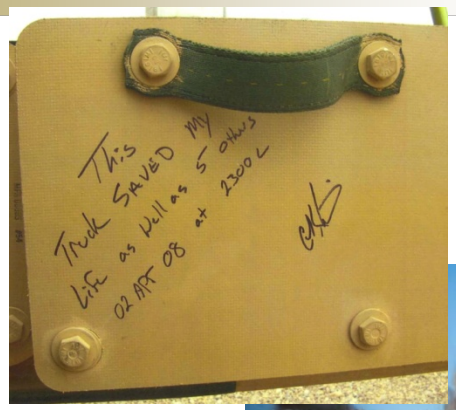
Technology Insertion into Future MRAP Production/Retrofit

- Onboard Electric Power Enhancement
  - Leveraging Stryker and FCS Common Modular Power System development
  - Pursuing APU and Dual Alternators as Risk Mitigation
- Common C4 Architecture
  - Supports future growth and possible FCS technologies
- Survivability Enhancements
  - Improved Gunner Restraint System
  - Overhead Wire Mitigation System
  - Automated Fire Extinguishing System
    - Crew Compartment, Engine Compartment, Tires
  - Improved Seats/Seat Belts

MRAP All Terrain Vehicle

- Request for Information / Market Survey Issued 21 Aug 2008.
- Responses received September 2008.
- Requirements Based On JUONS.
  - MRAP Protection Levels.
  - Agility, Maneuverability, Mobility of HMMWV
- Industry Input Will Be Evaluated To Determine Achievability of Defined Need
- Assuming Evaluation Determines One or More Approaches Submitted are Viable to Achieve Stated Requirements Funding Will be Requested.

MRAP Survivability



- BACK-UP SLIDES

Who's Who in JLTV Development

Program Governance
- OSD / ARMY / NAVY
- Program Certification & Milestone Decisions

Material Development
- PEO CS & CSS / PM JCSS / PM JLTV
- Program Management
- Milestone Documentation Development

Requirements Development
- CASCOM / MCCDC
- CDD Development & Staffing for Approval

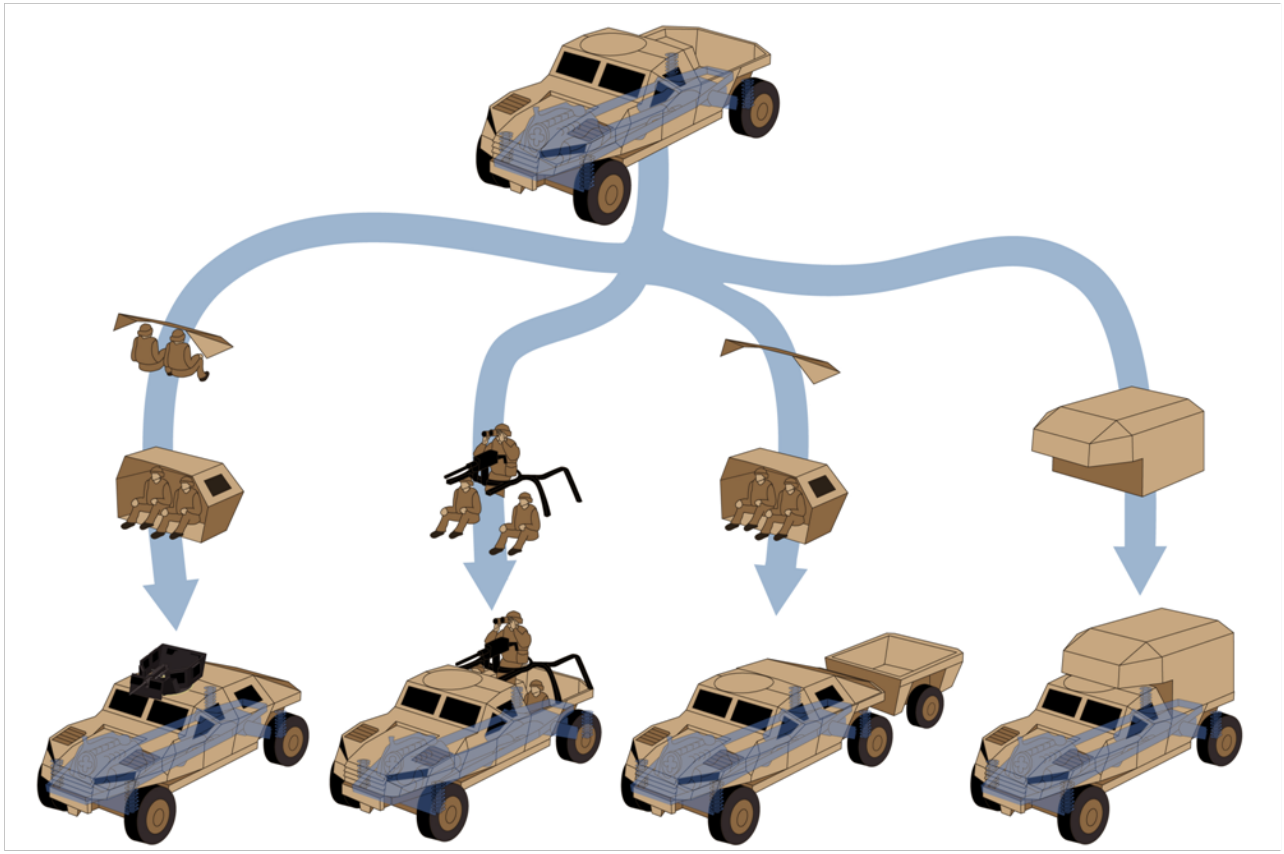
Industry
- BAE Systems – Ground Systems
- Lockheed Martin Owego
- General Tactical Vehicles

Science & Technology
- TARDEC / ONR
- Technology Development
- Trade Studies to Support Requirements Development

International Participants
- Countries: Australia, Israel & Canada
  - PA: Australia
  - Pending PA / Technical Discussions: Israel
  - Data Exchange Agreements: Canada & UK

Commonality within FoV w/ Trailers

JLTV Cat B, IC.



JLTV to be designed for commonality beyond major components, to include repair parts, tools, training, system design, maintenance procedures and sources of supply

MRAP Team

SPAWAR

DoD

DoN USMC

DCMA

DLA

LOGCOM

DoA

Joint Program Office
Warfighters We Will Protect
MRAP
SURVIVABLE
Mine Resistant Ambush Protected Vehicles

DoAF

SAF AC

ATEC

ASN RDA

DoN

Aberdeen Test Center

SOCOM

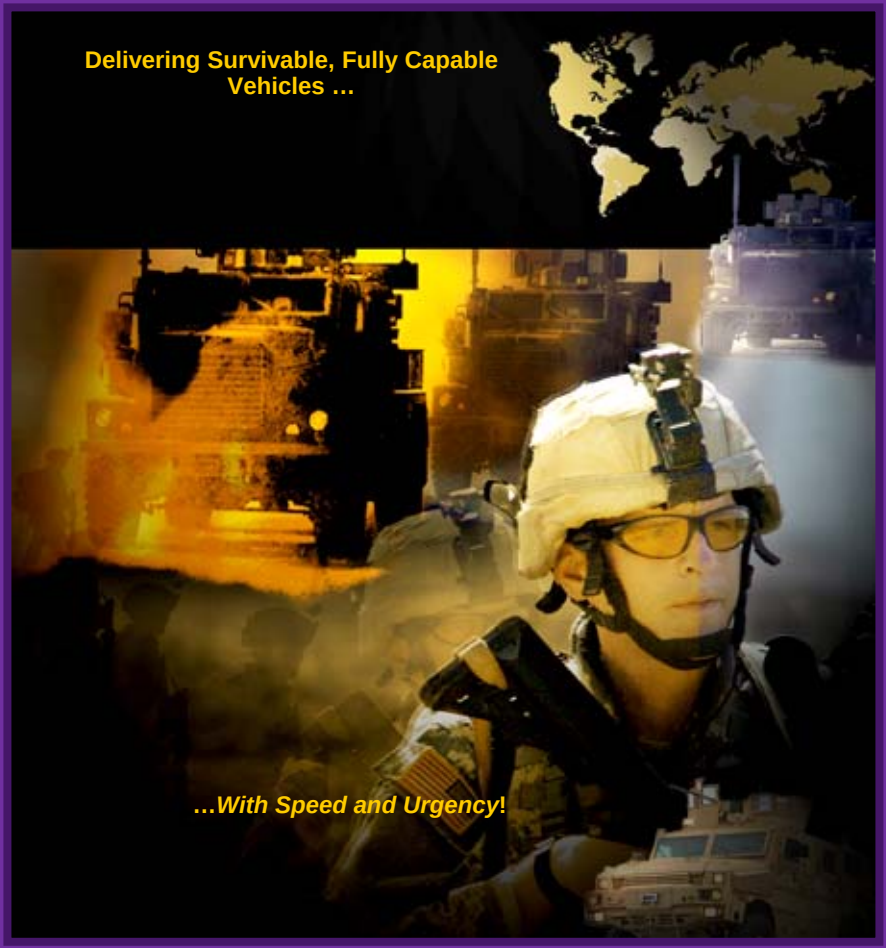
PEO CS&CSS

NAVFLAC

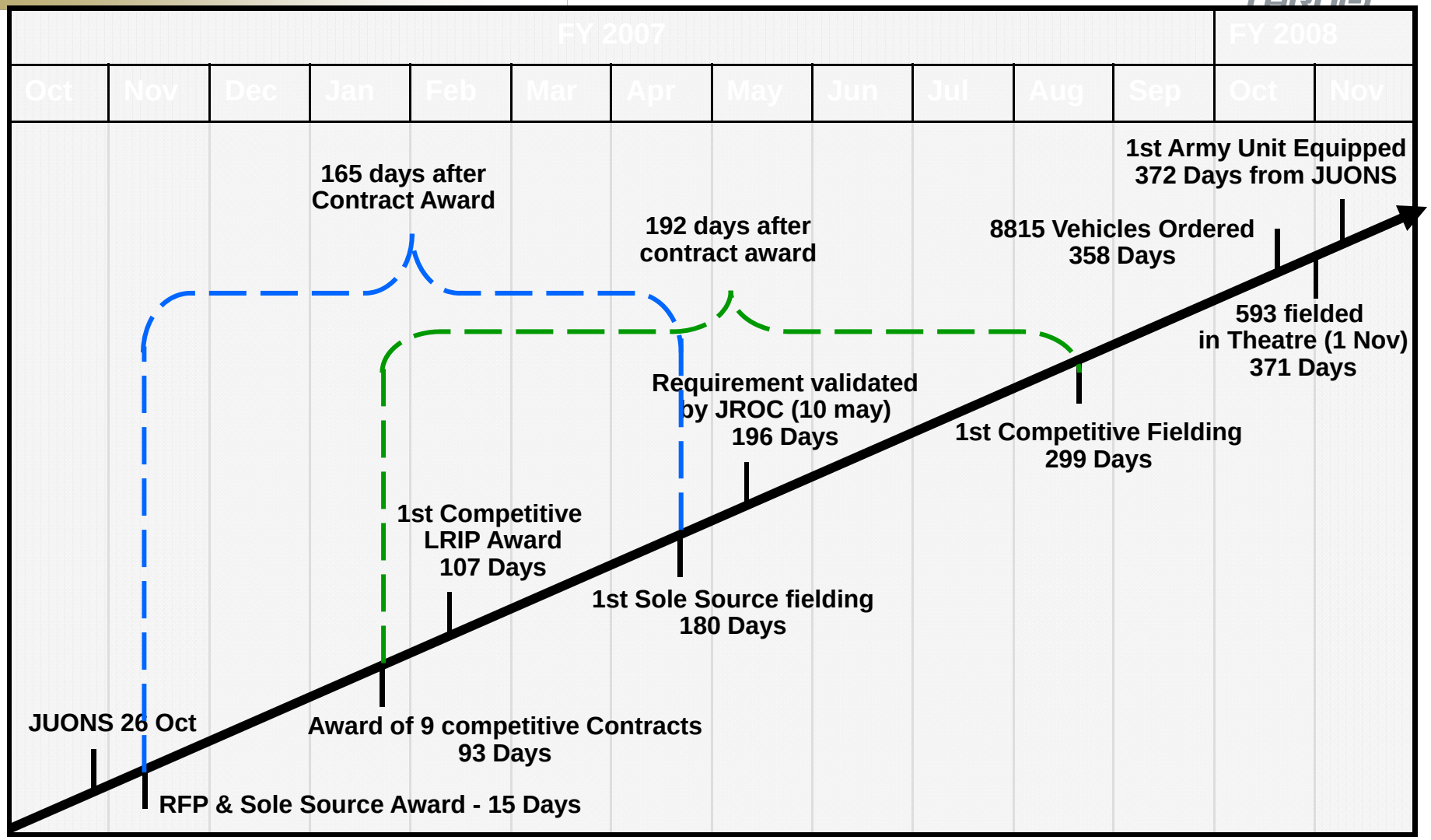
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Tactical Response

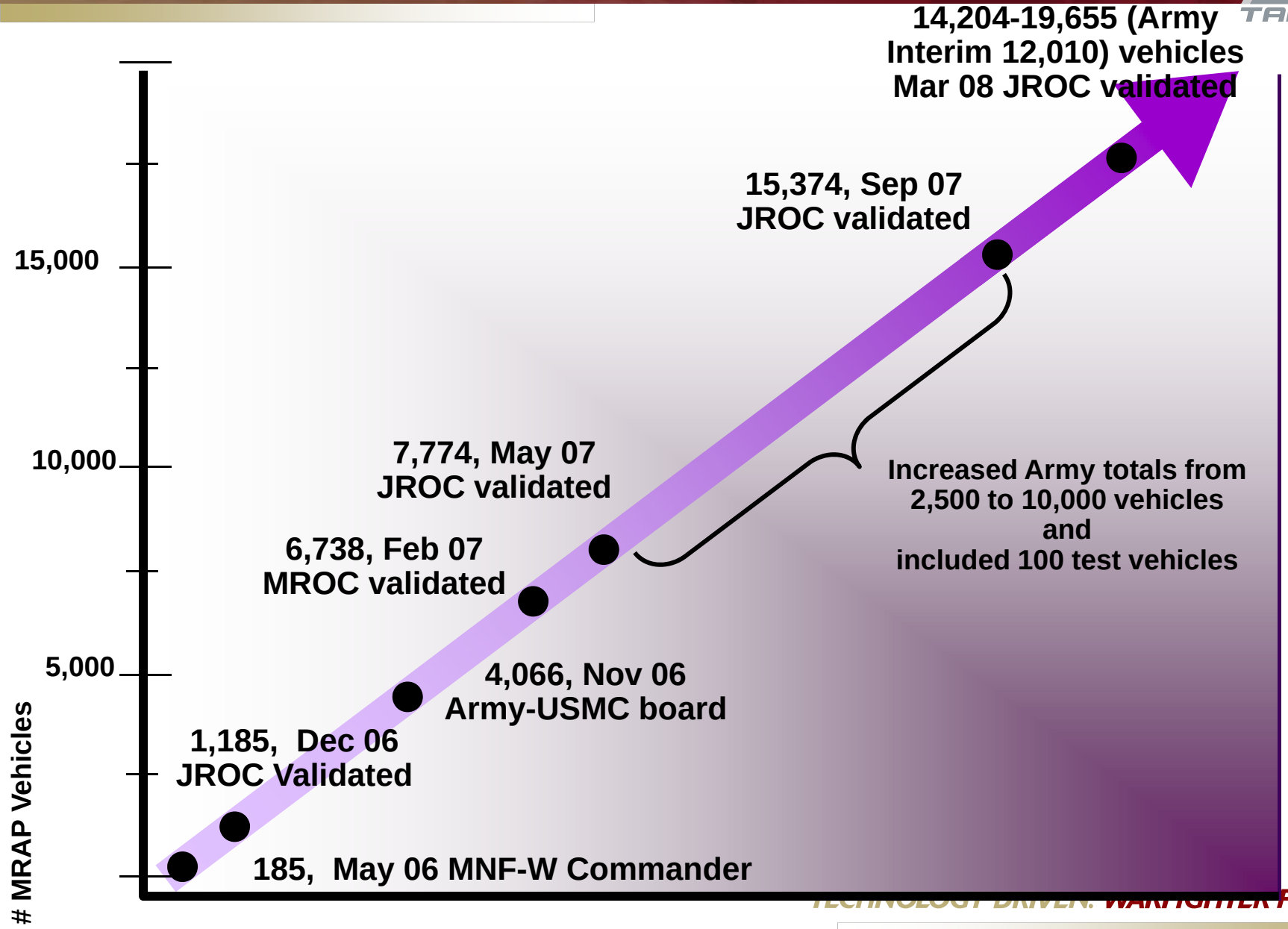
- Change in enemy tactics generated an urgent Warfighter need for:
  - Mine Resistant Ambush Protected Vehicle
  - Large quantities
  - Required ASAP
- MRAP Program is the response to this urgent need
  - Unprecedented effort
  - Unprecedented speed
  - Unprecedented Gov / Industry Teamwork



Mission In Motion

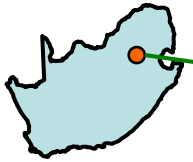


Operational Demand Signal



MRAP Vendor Locations

Benoni, South Africa



GDLS-C

CAT I RG31E

Capsule fabrication
– Demmer, Lansing, MI
– Benoni, South Africa
Chassis
– Spartan, Charlotte, MI
– Benoni, South Africa
Capsule fabrication, welding and final assembly
– York, PA
– Benoni, South Africa

BAE

CAT I SOCOM

CAT II HAGA

CAT II RG 33L

Capsule fabrication
– Demmer, Lansing, MI
– BAE, York, PA
– BAE, Aiken, SC
Chassis
– Spartan, Charlotte, MI
Welding and final assembly
– BAE, York, PA

FPII

CAT I COUGAR

CAT II COUGAR

CAT III BUFFALO

Capsule fabrication
- Ultra Machines, Kings Mtn, NC
- MCLB, Albany, GA
- FPII, Charleston, SC
- Armor Holdings, Sealy, TX
Chassis
- Spartan, Charlotte, MI
Welding and final assembly
- FPII, Charleston, SC

BAE-TVS

(Formerly Armor Holdings)

CAT I CAIMAN

Capsule fabrication
- Armor Holdings GVSD, Fairfield, OH
- Armor Holdings Sealy AD, Phoenix, AZ
Chassis
- Armor Holdings TVSD, Sealy, TX
Welding and final assembly
- Armor Holdings TVSD, Sealy, TX

IMG

CAT I MAXXPRO

Capsule fabrication
- IMG, West Point, MS
Chassis
- IMG, Gap, TX
Welding and final assembly
- IMG, West Point, MS
Armor
- Plasan Sasa, Israel

Plasan Sasa, Israel

The MRAP Team - Production

- 62 Major Tier 2 vendors for 15 critical sub-assemblies, for example:
  - Armor (8)
  - Diesel Engines (3)
  - Suspension components (9)
- Defense Contract Management Agency (DCMA)
- Testing and Evaluation Commands

MRAP Vehicle Requirements

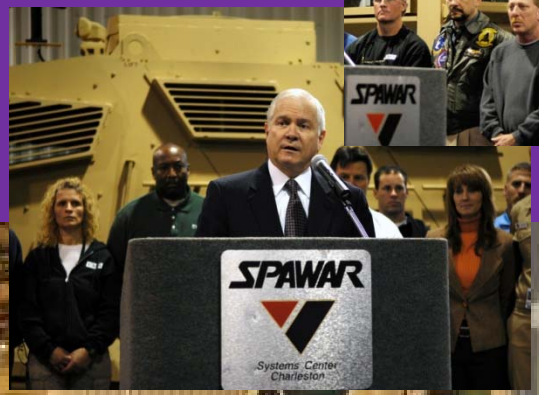
MRAP Vehicle Requirements			
Service	JROC Service Requirements	Procured Against Requirements	Remaining Vehicles to Order
USMC	2,225	2,209	16
Army	12,000	12,000	0
Navy	544	544	0
Air Force	558	558	0
SOCOM	378	378	0
Ballistic Testing	133	133	0
Total	15,838	15,822	16

- Above based on JROCM 151-08 dtd 28 July 2008)

- JROCM 226-08 dtd 20 November 2008 increases Total to 16,238. These addt'l 400 vehicles will be allocated among the Services and SOCOM to support the efficient fielding and coordination of the Theater Commander's priorities.

The MRAP Team – Integration

- SPAWAR System Center
  - Now integrating an average of 50 vehicles per day.



Lean Six Sigma Consortium of Government and Industry

The MRAP Team - Fielding

- Services and Components
  - USMC
  - USA
  - USAF
  - USN
  - SOCOM
- Service Logistic Commands
- Warfighters

Original Plan

7,774
Vehicles on Order

- Centralized Fielding
- Centralized Support Requirements
- 90 Day Parts Block

+

Warfighter Feedback and Lessons Learned

=

Current Reality

16,238
Vehicles on Order

- Decentralized Simultaneous Fieldings
- Decentralized Support Requirements
- Hybrid/Organic Support Concept

Trade-Offs

- Speed to field
- Multiple variants
- Urgent Fielding
- COTS
- Variations along the way

VS

- **Complete Testing**
- **One variant**
- **Fully supported**
- **Designed for Services**
- **Configuration controlled**