



# MSTV

MODELING AND SIMULATION, TESTING AND VALIDATION



## MSTV Mini-Symposium Preview

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TARDEC-RBG-CASSI

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

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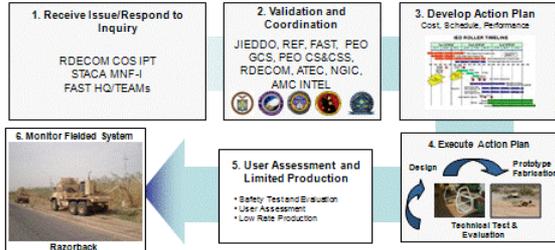
1. REPORT DATE <b>07 AUG 2009</b>	2. REPORT TYPE <b>N/A</b>	3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>MSTV Mini-Symposium Preview</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) <b>Mark J. Brudnak</b>		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000</b>		8. PERFORMING ORGANIZATION REPORT NUMBER <b>20140</b>	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S) <b>TACOM/TARDEC</b>	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S) <b>20140</b>	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>			
13. SUPPLEMENTARY NOTES <b>Presented at NDIAs Ground Vehicle Systems Engineering and Technology Symposium (GVSETS), 17 22 August 2009, Troy, Michigan, USA, The original document contains color images.</b>			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	
19a. NAME OF RESPONSIBLE PERSON			

# TARDEC as the Ground System Integrator

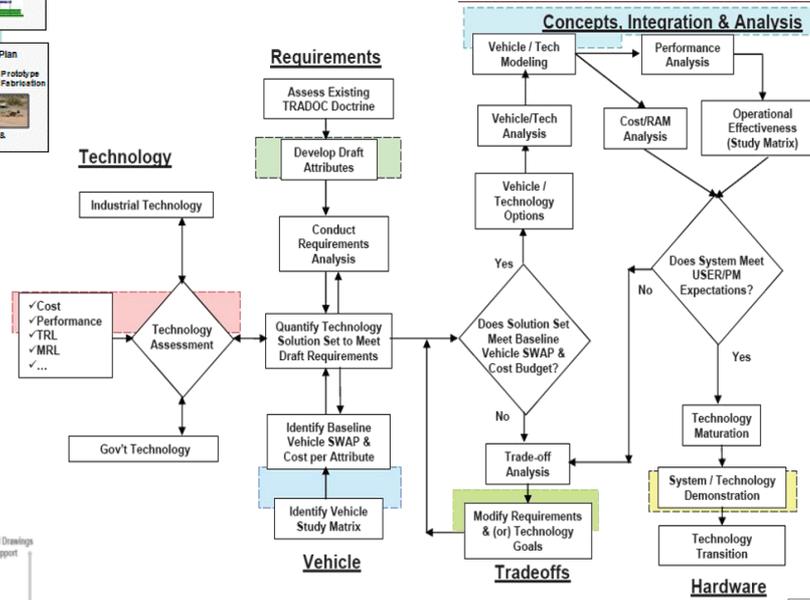
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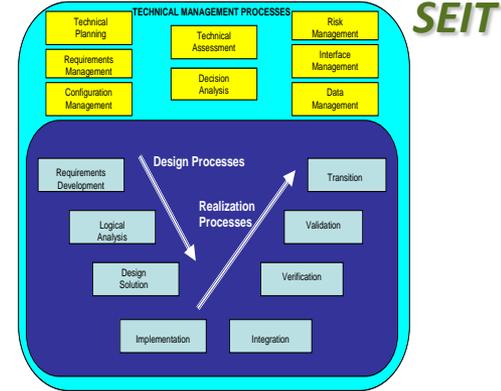
## QRC



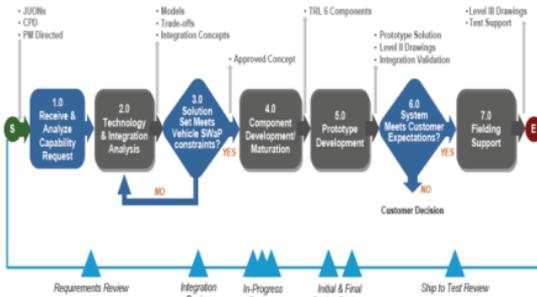
## CASSI



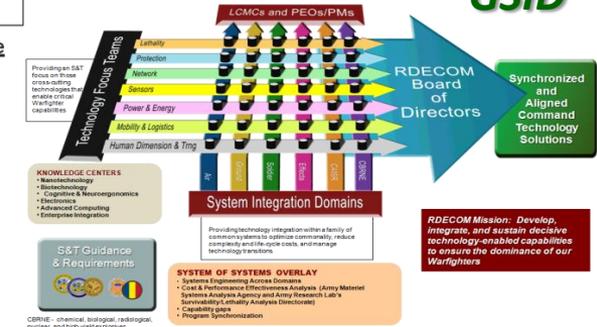
## SYSTEMS ENGINEERING PROCESS MODEL



## GVIC



## GSID



# CASSI's Role In Systems Integration



## Mission:

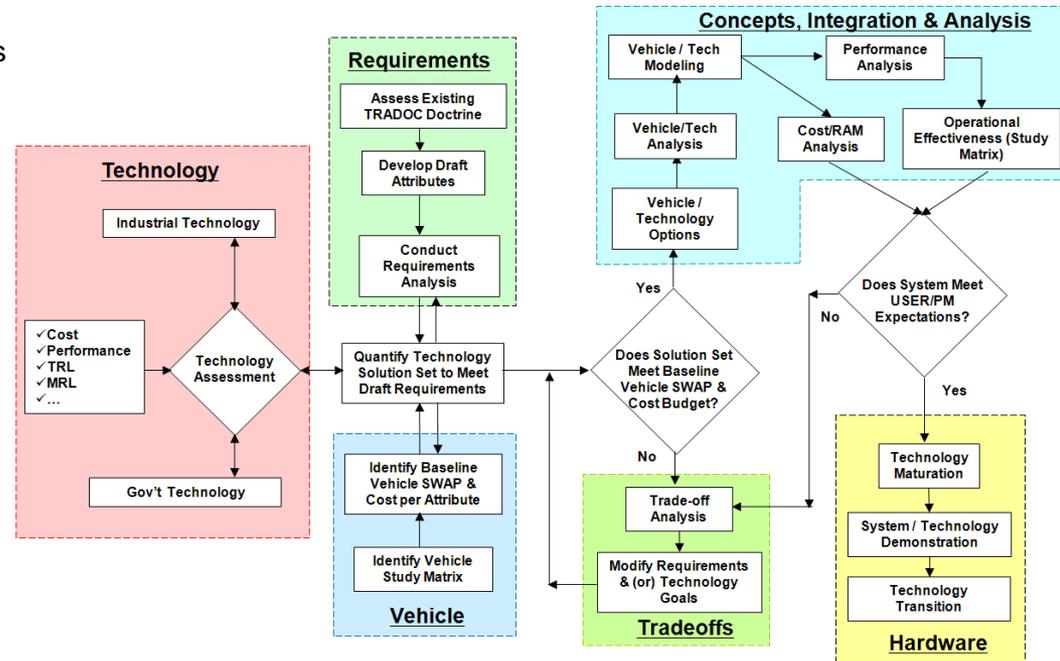
- Provide Rapid Assessment and Integration Services to both Technology and System/Platform Development Programs
  - Throughout the Lifecycle (Rqts – Tech – Int'n – Demo – Prod – Sust – PiP)
  - Consider Warfighter, System, and System-of-Systems Contexts

## Objectives:

- Provide Systems/SoS 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



# CASSI Functions

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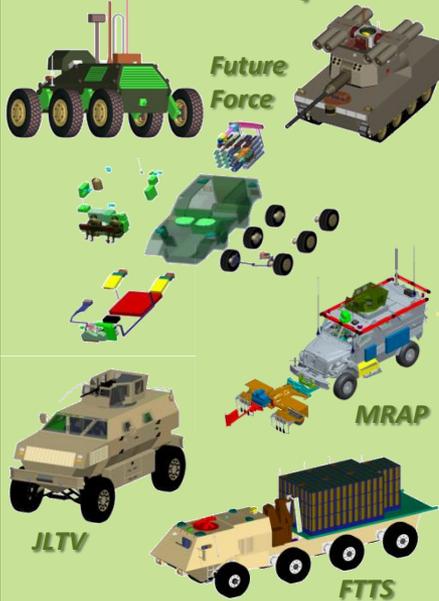
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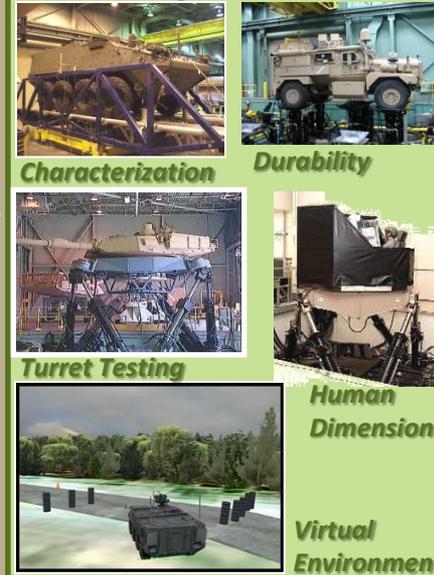
### Advanced Concepts



### Analytics



### Hardware & Man-In-The-Loop Simulation



### Integration & Demonstrators



### HPC & Data Management



HPC



CAVE



ACE



# MSTV VIP Speakers



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## **Mr. Scott Rutter – BAE Systems**

Business Development Director

*Modeling and Simulations: Meeting the Needs for the Future Force*

## **Mr. Scott Stilson – General Dynamics Land Systems**

Chief Engineer, Stryker Modernization (S-Mod) Program

*The Application of Modeling and Simulation to the S-Mod Program*



# Power and Energy/Mobility Session

Mr. Mike Pozolo – *TARDEC*

Dr. James Critchley – *BAE Systems*

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## ***\*Interior Permanent Magnet Machine for Use in the XM1124 Hybrid Electric HMMWV***

Justin Owen and Mike Marcel – *DRS Test & Energy Management, LLC*

Wes Zanardelli – *TARDEC*

## ***Simulation-based Design for Actively Controlled Suspension Systems***

Joseph H. Beno, Damon A. Weeks and Jason R. Mock – *University of Texas*

## ***Fuel Economy and Mobility of Multiwheel Drive Vehicles***

Jeremy Gray – *TARDEC*

Vladimir Vantsevich – *Lawrence Technological University*

## ***A Modular Model Architecture in Modelica for Rapid Virtual Prototyping of Conventional and Hybrid Ground Vehicles***

John Batteh & Michael M. Tiller – *Emmeskay*

## ***Family of Medium Tactical Vehicle Transmission Fuel Economy Study: Evaluation of AMT Performance Using Experimental and Analytical Methods***

Matt Van Benschoten & Evan Nelson – *Roush Industries*

## ***Time-dependent Simulation Methods for Vehicle Thermal Management***

Dr. Ilhan Bayraktar – *Oshkosh Corporation*



# Reliability Modeling Session

Dr. David Lamb – *TARDEC*

Dr. David Mortin – *AMSAA*

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## ***A Robust Durability Process for Military Ground Vehicles***

Nammalwar Purushothaman, Paramsothy Jayakumar & James Critchley – *BAE Systems*

Sandip Datta & Venkat Pisipati – *TAC World Wide*

## ***An Integrated High-performance Computing Reliability Prediction Framework for Ground Vehicle Design Evaluation***

Dan Ghiocel – *GP Technologies, Inc.*

Dan Negrut – *University of Wisconsin*

David Lamb & David Gorsich – *TARDEC*

## ***Influence of Loading Distribution of M1 Suspension on Predicted Track System Durability***

David Ostberg & Bill Bradford – *TARDEC*

## ***Vehicle Prognostics: Understanding Usage Severity and Potential Damage Accumulation for Combat Vehicle Suspension Components***

Mark Pompetzki & Brian Dabell – *HBM-nCode Products*

Joseph Gothamly & Jim Bechtel – *TARDEC*

## ***Reliability and Complexity of Unmanned Ground Vehicles***

Arati Dixit & Dr. Harpreet Singh – *Wayne State University*

Grant R. Gerhart – *TARDEC*



# Human Dimension Session

Mr. Harry J. Zywiol, Jr. – *TARDEC*  
Dr. Kaleb McDowell – *ARL*  
Mr. Rob Smith – *TARDEC*



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## ***Human Dimension Introduction — The Army's Need for Cognitive Engineering***

Kaleb McDowell – *ARL*

Harry J. Zywiol Jr. – *TARDEC*

## ***The Utility of a Ride Motion Simulation in a Neuroergonomic Approach to Systems Design***

Kelvin S. Oie – *ARL*

Victor Paul – *TARDEC*

## ***Understanding Soldier Tasks for Effective Simulation***

Teena Garrison & Mark Thomas – *Mississippi State University*

## ***Simulating Crew Ingress and Egress for Ground Vehicles***

Matthew P. Reed – *University of Michigan*

## ***Introduction of a Ground Vehicle Integrated Thermal Model***

Jing Pang, Daniel Chue & Mark Rupersburg – *GDLS*

## ***Development of a Validated Thermal Model of Air Conditioning Performance in a Ground Vehicle***

Joshua Pryor, Julia Mao, Aaron Ditty & Pete Rynes – *ThermoAnalytics*

Rob Smith – *TARDEC*



# Hardware-in-the-Loop Session

Mr. Scott Lohrer – *TARDEC*

Mr. Wilford Smith – *SAIC*

Dr. TC Lin – *BAE Systems*

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## ***A Reconfigurable HIL Test Stand***

Ashok Nedungadi & Karl Kreder– *Southwest Research Institute*

## ***A Combat Systems Integration Lab for Engineering Life Cycle Support***

Dr. Kevin Chang, Christopher Johnson, TC Lin, Kasra Naghshineh, Sun Kwon & His Shang Li – *BAE Systems*

## ***Investigation of Control Algorithms for Tracked Vehicle Mobility Load Emulation for a Combat Hybrid Electric Power System***

Jarrett Goodell & Wilford Smith – *SAIC*

Byron Wong – *TARDEC*



# Gaps and Challenges Session

Dr. Matthew P. Castanier – *TARDEC*

Mr. Mark Rupersburg – *GDLS*

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## ***Simulation-based Reliability Systems: A University/Industry Consortium Focused on Simulation-based Solutions for Ground Vehicles***

Roger L. King – *Mississippi State University*

Paul Decker & David Gorsich – *TARDEC*

## ***Structural Topology Optimization for Blast Mitigation Using Hybrid Cellular Automata***

John Goetz, Huade Tan, Andres Tovar & John E. Renaud – *University of Notre Dame*

## ***System Design by a Network of Optimizations***

Dr. Jim He – *Michigan Engineering Services, LLC*

Christopher G. Hart & Nickolas Vlahopoulos – *University of Michigan*

## ***A Probabilistic Multidisciplinary Design Optimization Approach with Application to Ground Combat Systems Design***

Vik Ganesan – *GDLS*

## ***Assessment of a Bayesian Model and Test Validation Method***

Y. Pai, Michael Kokkolaras, Gregory M. Hulbert & Panos Papalambros – *University of Michigan*

Mike Pozolo – *TARDEC*

Y. Fu, R.J. Yang & S. Barbat – *Ford Motor Company*



### ***Engine, Battery, and Vehicle Simulation Strategies for Transmission Testing***

Bryce Johnson – *HORIBA Instruments, Inc.*

### ***Analysis of Spinal Compression in Blast Environments***

James Eridon – *General Dynamics Land Systems*

### ***Applicability and Simulation of Federal Automotive FMVSS Standards in Light Military Vehicle Occupant Protection Development***

Nripen Saha and Mark Rupersburg – *General Dynamics Land Systems*