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Analysis and Assessment Campaign Overview

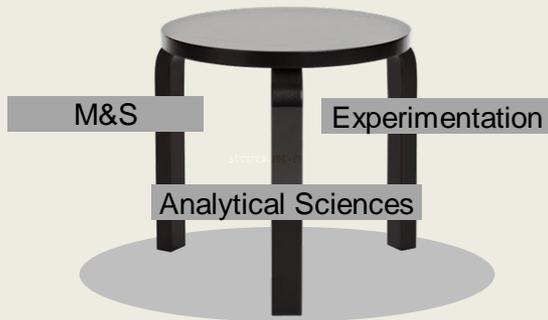
Dr. Patrick Baker

Campaign Lead – Analysis and Assessment

Army Research Laboratory

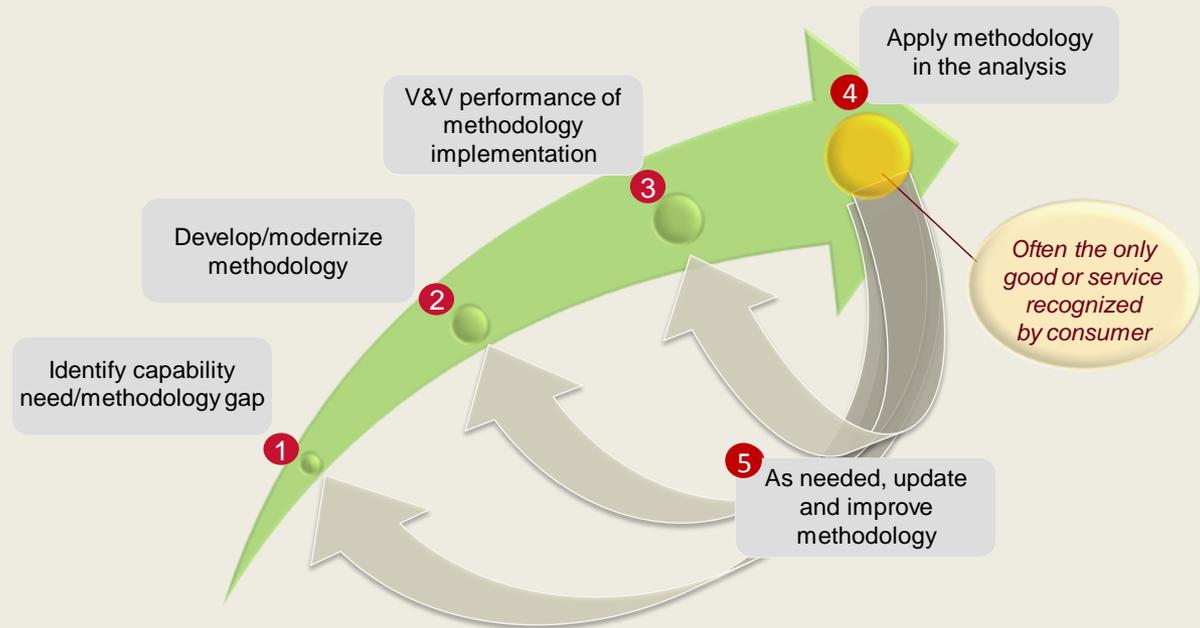
Analytical sciences and assessment techniques for materiel and combat development, test and evaluation, and decision making to increase readiness and ensure future Army overmatch

Methodology Paradigm



Methodology development is required to analyze complex interactions between systems and threats

Methodology Implementation Process





Assessing Mission Capability of Systems

- Ballistics
- Electronic Warfare
- Cyber
- Human Systems
- Systems of Systems
- Reliability, Availability, and Maintainability

Assessment of Science and Technology

- Vulnerability Assessment and Analysis of Technologies
- Assessing Adaptability and Susceptibility of New Technology

Science and Technology of Assessment

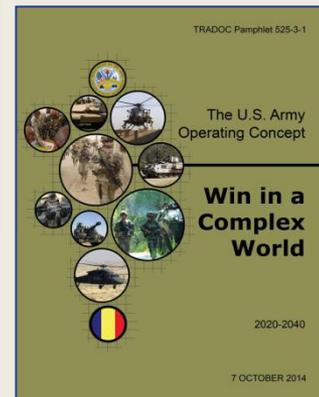
- Verification and Validation Techniques
- Assessing adaptability of complex systems in an unknown environment

Systems Capable to Assess Missions

- Smart Platforms
- In Situ Assessment of Systems

“Finally we must assess our efforts and continuously be prepared to adapt to unexpected opportunities and unanticipated dangers.”

GEN David G. Perkins
Commanding General U.S Army
TRADOC

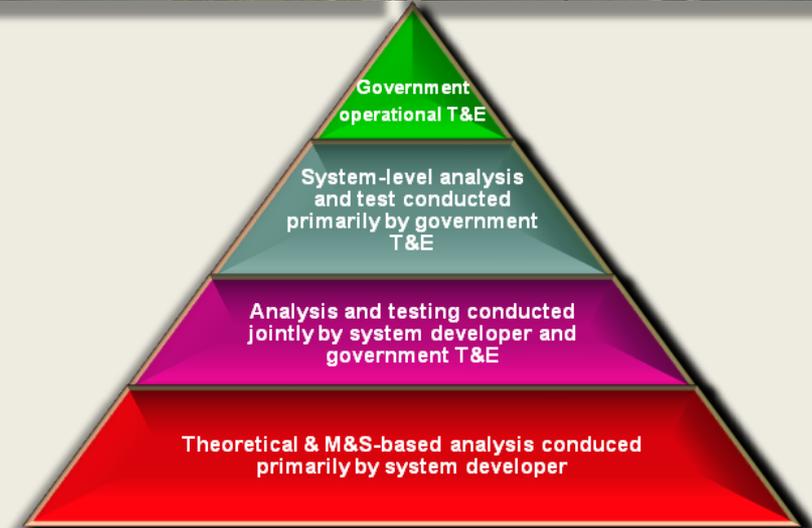
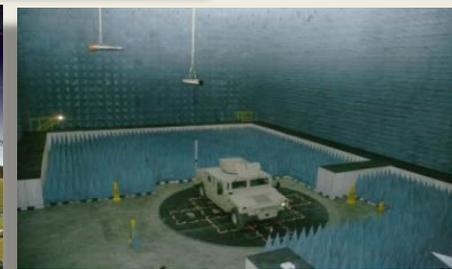
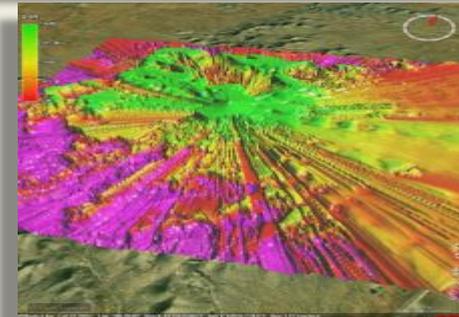




- **Objective:** Methodologies that assess and evaluate the effects of attacks on electronic systems

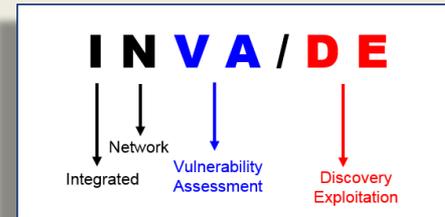
- **Technical Challenges:**

- Simulation and measurement of complex, dynamic environments and interaction effects
- Electromagnetic environment source generation capabilities, signatures, and predictors of presence
- Controlled environment (Laboratory, HWIL, anechoic chamber) analysis development



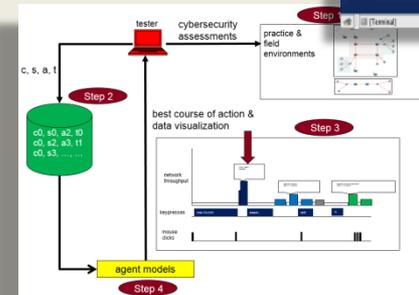
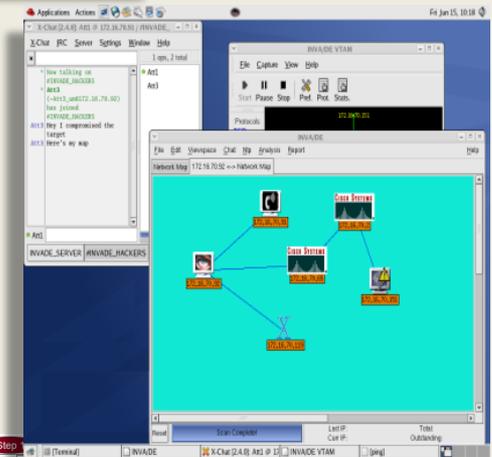


- **Objective:** Methodologies to assess security posture of emerging technologies at operational tests and other events



- **Technical Challenges:**

- Cyber vulnerability assessment and instrumentation tools leveraging advanced intelligent systems
- Framework for cyber penetration testing and Red Teaming
- Data analytics
- Malware reverse engineering and analysis
- Security code analysis





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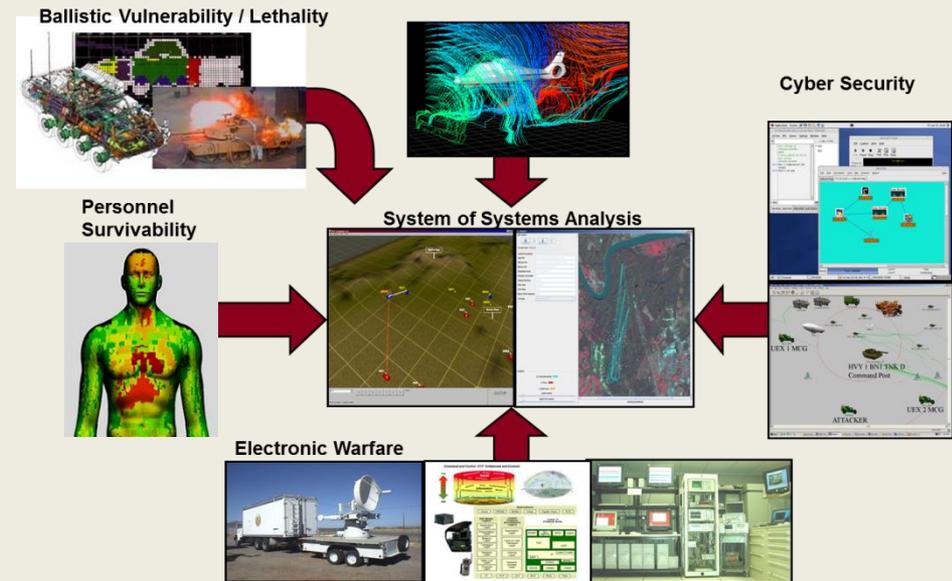
System of Systems: Decision Analytics and Visualization

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Objective: Assess mission impacts of new or revised technology, tactics, or threats by modeling combat scenarios at an engineering level of detail.

• Technical Challenges:

- Agent-based, decision-driven architecture and flexible, variable fidelity treatment of phenomena distinguish
- Higher-fidelity System-of-systems modeling of multiple threat domains
- Cognitive models in decision-making processes to include effects of physical and cognitive loads





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QUESTIONS



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Why Does Your Army Care?

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• Army benefits of A&A campaign

- Technical assessments support independent, objective evaluations
- Quantitative threat-system effects for force-on-force analysis
- Feed analysis-of-alternatives to affect requirements and acquisition decisions
- Early and quantitative Human System Integration analysis for concept exploration, design, and acquisition.
- Early assessment of innovations for risk-mitigation at much reduced cost

• Conceive, develop, and maintain distinctive Army analysis capability

Major Accomplishment: Contributed to Improved Survivability of Army Networks





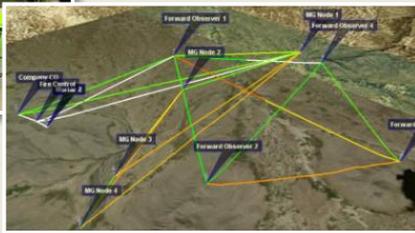
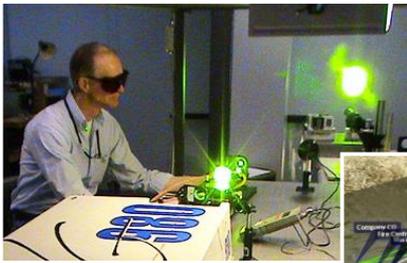
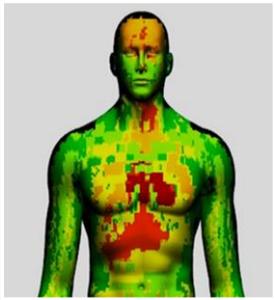
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A&A People and Expertise

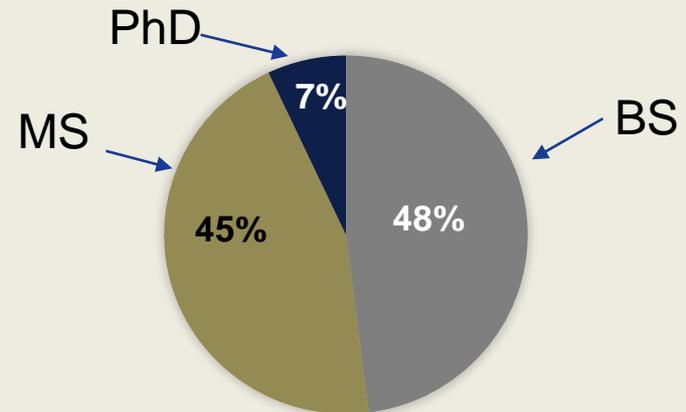


A&A has over 250 experts engaged in experimentation, methodology development, and analytical science in:

- Ballistics
- Injury biomechanics
- Electronic warfare
- Electro-optics
- Cyber security
- Human performance assessment
- Complex systems



S&E EDUCATION





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“War is ninety percent information.”

Napoleon Bonaparte, French Military and Political Leader

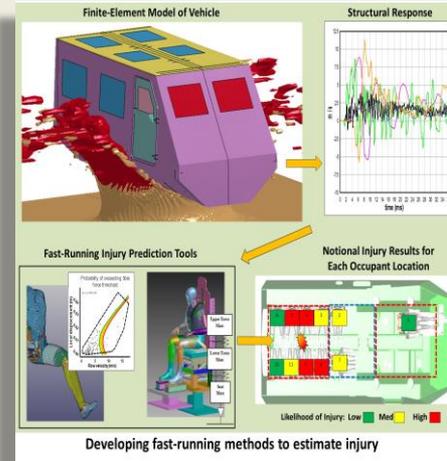
“If you do not know how to ask the right question, you discover nothing.”

W. Edwards Deming

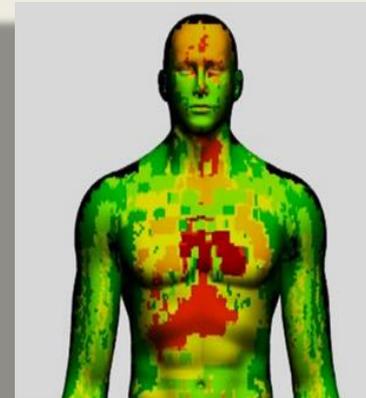
<http://www.analyticshero.com>

We seek your help in defining the important questions to gather information the Army needs to help ensure Readiness and Overmatch in the future force

- **Objective:** Innovative methodologies to quantify, model, predict effects of future weapons against systems and people
- **Technical Challenges:**
 - Advancing analytic tool-sets
 - Methodologies for complex threat-system interactions
 - Complex target modeling capabilities
 - Modeling anatomical damage and physiological for emerging damage mechanisms



Under-body blast methodology used to provide T&E recommendations for JLTV EMD test events



Injury mapping techniques for varying morphologies allow for a larger domain of anthropometry



- **Objective:** Methodologies for assessment of cognitive and physical human performance tradeoffs and workload in support of Human Systems Integration (HSI)
- **Technical Challenges:**
 - HSI modeling for improved performance
 - Developing and enhancing human performance modeling tools
 - Decision-making research

Developed Military Anthropometry Resource Companion (MARC) MARC App – first interactive resource to aggregate multiple sources of Army anthropometry and associated statistical design tools. Currently being evaluated with Army human factors practitioners.

